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Sometimes

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THE FOUNDRY

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Mechanical and Physical Tests Compared.

BY S. S. KNIGHT.

Since the appearance of the November number of THE FOUNDRY, the author's attention has been called to that part of his article, "Effects of Heat Upon Cast Iron," in which he states that if the phosphorus in any metal exceeded .9 of a per cent the location of the larger quantity of phosphorus will be near the bottom of a cylinder, providing the same be cast on end This statement should have been qualified somewhat, as the author regarded only soft mixtures and in no way intended to establish .9 per cent as the line of demarcation, but since the results were more pronounced when such a quantity existed, he used that percentage only as a relative limit.

The author has never seen any definite statement in any standard work on metallurgy which gave any information as to the condition in which phosphorus existed in cast iron.

That all of this element does not exist in the tribasic state is very certain, since if no oxidizing agents are used in the analytical process and the ordinary acetate or molybdate methods are employed only part of the phosphorus is found and usually a very small percentage of the total amount present.

It has been stated on good authority and has been verified by analysis that in hard iron, especially that which must receive a chill of two inches or more, the phosphorus is always higher at a point a foot or so from the top.

Thus in a chilled roll as shown in sketch, A, B and C represent places from which samples were taken.

A showed .498 per cent of P.
B showed .540 per cent of P.
C showed .385 per cent of P.

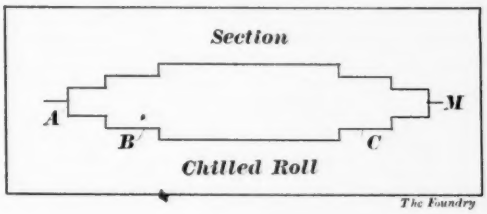
The roll was cast on end, M being the bottom.

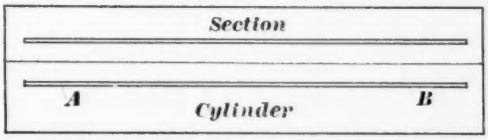
In this connection the analysis of a soft iron cylinder is also given to show that even with comparatively low phosphorus silicious irons the results as stated in the previously referred to number are very marked. The cylinder was over 12 feet long and was cast in the same position as the chilled roll. The iron was exceptionally strong, having a tensile strength of 25,000 pounds per square inch section. The samples were taken out as shown in the accompanying sketch.

The samples from A analyzed as follows:

Silicon	2.821 per cent.
Sulphur	.024 per cent.
Phosphorus	.470 per cent.
Manganese	.394 per cent.

Drillings from B were the same except in phosphorus, which was .80 per cent.





The unusual difference may in part be accounted for, by the low heat at which the metal was melted and also the much greater pressure which the material at B was subject to.

From similar analysis and observations the author finds that all cases which have come under his notice can only be accounted for by one hypothesis.

The iron when melted in a cupola is not subject to the action of oxidizing agents to such an extent as a casual observer would imagine. In a well operated cupola the metal would not melt more than eight inches above the tuyeres and in most cases much below this.

The fuel—almost pure carbon—below the tuyeres is incandescent, and since but little oxygen can exist below the blast port line, the last influence to be operative upon the molten metal is the reducing power of the carbon, whose surface is no less than one thousand times greater than that of the iron running through it. Therefore it seems most reasonable to suppose that of the compounds of phosphorus presents the greater should be reduced or free from oxygen.

If it be granted that the major portion of the phosphorus exists in the form of reduced compounds, the explanation of the above phenomena follows at once.

The only reduced phosphorus iron compounds are the phosphides of iron.

The protophosphide would be formed only when the iron was melted at a moderately low temperature. At the temperature of molten iron no crystallization would be possible, and since the cohesion of the particles is mostly broken up, the compounds of the greatest density will naturally sink to the lower level. The protophosphide of iron has the formula of F e 3 P 2, and the compound is of course binary. Since the atomic weight of iron is 56 and that of phosphorus 31 the molecular weight of the protophosphite would be $(3\times56)\times(2\times31)\div2=115$; the weight of hydrogen being considered unity. This, of course, when mechanically mixed with molten iron whose weight is 56 would sink until the pressure had so increased the density of the fluid iron, that its descent would be stopped. This explains why in soft iron, i. e., iron melted at a moderate heat, such as is required for the liginfaction of soft iron; the greater per cent of phosphorus always tends to be near the bottom. Of course the casting could be made such a length that the location of the greatest percentage of phosphorus would be nearer the top than the bottom, on account of the pressure of the fluid iron above.

The degree of heat necessary for the melting of hard iron is such that whatever reduced compounds of phosphorus could be existent in softer irons would be changed to the sesquiphosphido. The change would be represented in the equation F e 3 P 2=2 F e P + F e. This compound has the formula F e P and like the ferrous phosphide is binary. Hence the molecular weight is $56\times31\div2=43.5$. This being much lighter than iron, it is forced to the top.

The cooling begins at the top, and as the iron crystalizes, the impurities—among them the iron sesquiphosphide—are forced out and down into that portion of the metal which is still fluid. As soon as the upward pressure equals the pressure down, the impurity remains stationary until solidification takes place. This accounts for the greater amount of phosphorus being a foot or more from the top.

This is not to be considered as absolute knowledge, but as an hypothesis given to explain and correlate the facts which have been noted from observation and analysis.

So far as he knows, the author is confronted by no facts which do not coincide with his theory, but if any are known no one will be more pleased to be informed or more ready to accept any seemingly more reasonable hypothesis than he. He feels greatly indebted to Mr. E. A. Kebler, formerly of Cincinnati, for his interest and his aid in the accumulation of data concerning this point, and the facts which he cited, and the criticisms which he made.

It might not be amiss to here state that the author takes it for granted that hard iron melts at a higher heat than soft iron. If a pig of 2 soft iron and one of No. 5 be laid side by side upon the plate at the charging hole of a cupola when the last iron is melted and the results observed, the experimentor can hardly draw his conclusions far from correct.

Leaving the subject of phosphorus and turning to the tests which are made in iron foundries, there is no subject which has been so fruitful for discussion as this.

Chemists naturally declared for chemical analysis, while those not having laboratories at their command, consider the mechanical as the most efficient. Generally speaking, the line of demarcation may be drawn here; mechanical tests analogous to those used in determining shrinkage, hardness, fluidity, chill and tensile and transverse breaking strains, together with the limits of elongation and elasticity are relative, since they are almost wholly dependent upon or, at least, greatly influenced by the previous treatment the iron has received, while chemical tests are more or less absolute in their

nature, since they deal solely with composition.

In the class of mechanical tests, the trouble seems to be that no system is generally used, each foundry having its preference both for a certain sized unit bar and the method of applying the tests. In all mechanical tests, however, the unit of comparison or computation is the test-bar. Here again physical tests radically differ from chemical, since the first is dependent for results on a molded casting as unsimilar in many respects as the pig metal from the required product, while the second does not depend on such qualities as are affected by obscure and uncontrollable conditions, but deals directly with the component materials whose influences and properties are conceded known.

As an example of this, test bars have been cast from the same ladle as nearly simultaneously as possible, and yet no two show the same result, although the conditions were as similar as could be produced. A series of bars are here given, all cast from the same ladle and in the same position as rapidly as they could be poured. The bars were tested on a Reilhe Bros. machine, and carefully measured at the place of fracture. The load was applied at the center and twelve inches from the supports. The mixture was Southern 2 soft irons and scrap, 66⅔% of pig metal and 33⅓% of remelt.

No.	Pounds.	Deflection.	Measurement.
1	2020	.44″	.980″ by 2.035″
2	1900	.38″	.985″ by 2.035″
3	1850	.39″	.985″ by 2.035″
4	1750	.37″	.960″ by 2.025″
5	1850	.35″	.965″ by 2.033″
6	2300	.41″	.955″ by 2.025″

It will be noted that the second and third, which measured the same, varied fifty pounds, and also that the sixth, although a small bar, broke at the greatest strain. Similar series might be produced ad infinitum, but the author has a single series of four or more bars to see which shows any homogeneousness in the result obtained by submitting them to any definite quantitative physical test.

On the other hand, all chemical tests can show is how much of any element exists, and sometimes in what combination. Usually the latter knowledge is considered of so little significance that no effort is made to determine anything but the quantity of the constituent elements. An exception is made sometimes in carbon, but even then the analyst estimates only what carbon is free or graphitic and what is combined with other elements. No estimation is made of manganese or titanium carbide, but simply the total combined carbon. It is here that chemical tests are robbed of their efficiency, since the effect of even small amounts of these two carbides (manganese and titanium) very materially alters the properties of iron.

It is nevertheless certain that chemical tests, as ordinarily applied, give a more comprehensive statement of the qualities of the metal than any mechanical test so far brought forward can. As proof of this, let any test bar be taken and examined and given all new and unfamiliar irons to produce like fracture to the test-bar; no sensible person would dispute that even the expert's chances of success would be very limited. This necessarily follows, since so many causes may either in part or entirely produce the same or similar results. Take, for instance, an ordinary foundry forge iron, graded wholly upon fracture. Its closeness may be due to (1) silicon, (2) excessive sulphur, (3) titanic and manganous carbides. The exponent of mechanical testing would consider the first cause only, since that alone can be judged by fracture. Although he might be familiar with the other causes, his testing machine could not determine the specific cause of the closeness.

It might be argued that high sulphur iron would be weak; that would be true, but how is he to know that there lies the trouble when many low sulphur close irons are also deficient in regard to strength. The weakness might be due to phosphorus, either acting alone or in unison with sulphur, low silicon or some like cause, since phosphorus tends to give pig metal a close, flat-grained appearance. If the dense fracture were due to titanic carbide the metal would be strong, while if due to manganese carbide, would be weakened if affected at all. From this it should not be inferred that all strong iron is necessarily high in titanium, but rather the converse, or that all titanic iron is strong.

The close grain must be due to some cause or causes, but how is the testing machine going to demonstrate which individual one is operative in any certain case. Chill is a factor upon which very little reliance can be placed. Shelby No. 5, which is capable of receiving a deep chill, contains the commonly estimated iron elements in about the following proportion. The silicon here given may be considered high:

Silicon	.658%
Sulphur	.023%
Phosphorus	.350%
Manganese	.670%

It presents a close gray fracture and is quite strong. Compare this with an open iron of great strength, such as Cranberry No. 2:

Silicon	.489%
Sulphur	.014%
Phosphorus	.030%
Manganese	.643%

The latter iron is open, very full of graphite, and in common terms quite "soft." How much can be told, or rather, can not be told by chill is evident when the above analyses are considered.

They also show that other things beside silicon give iron the power to hold uncombined or graphitic carbon between its crystals.

Suppose now the chemist in the same circumstances which lately perplexed the foundryman that tried to mix and buy his irons upon the so-called mechanical analysis. His chemical analyses will show him at least what causes could have been effective in rendering his iron close. He will know whether its strength or weakness is due to the lack of certain elements or the excess of others, and having the precise knowledge of the composition of the test-bar, it will not be hard for him to approximately duplicate it.

Only those causes will be unknown to him that will be unknown to the mechanic also, such as the hight at which the metal melts in the cupola, its melting temperature and the rapidity with which it cools.

The best results are accomplished, however, when both systems are simultaneously used, and the benefits of both utilized since the deficiencies of one method may be counter-balanced by the virtues of the other.

As regards the size of the test-bar or unit used, it seems reasonable that this should be governed entirely by the size and requirements of the finished product. It does not seem that the ½-inch test-bar which is quite generally in favor, could be more advantageously used in testing the metal in a heavy drum or large catch-all than the one by the 2-inch bar. The effect of chill and surface hardening is far greater in proportion to the amount of metal in a ½-inch than in a larger bar. Hence the necessity of using a bar adapted for the comparative measurements of the salable product.

Engineers in their specifications often require that all bars be cast on end. The theory upon which this was based was that if the bars were cast in this manner the grain of the metal would extend in the direction of a transverse section. To test this four bars were cast from the same ladle and poured as nearly at the same time as possible.

The results were as follows, all bars being approximately the same size:

No.	Brk. Strain.	Deflection.	Size.
1	1850 lbs.	.35 in.	1x2 in.
2	1950 lbs.	.40 in.	1x2 in.
3	1965 lbs.	.37 in.	1x2 in.
4	1600 lbs.	.32 in.	1x2 in.

The first and second were cast on end, while the others were inclined about 45 degrees. From this and numerous other like tests, the author has not been able to discover that the strength of any bar was ever augmented by being cast in a horizontal position. The pressure the metal is subjected to prevents or destroys any grain that it might otherwise have.

Not only the pressure of the fluid iron is to be considered, but also that developed by the expansion of the metal, when it solidifies, providing a soft iron is used.

Before leaving the subject of test-bars and their merits as standards of measurement compared with chemical tests, it should be noted that one means of determining the qualities of pig iron, which has been almost wholly ignored in the past, but which will, no doubt, be extensively utilized in the future is the microscope.

The author regrets his inability to show photomicrographs, which would tell at a glance the possibilities of this machine as a

source of definite information to the iron metallurgist. As an example of the foregoing statement very fine drillings were taken from a Southern 2 soft pig. These, when mounted in a solution of Canada balsam in chloroform, would show a dark crystalline mass, sometimes columnar in structure and appearing in bold relief like a planet when viewed through a small telescope. The crystals were all monoclynic in form. This appearance was noted when under 200 diameters magnifying powers was used. A hard iron, such as the tool steel mentioned in a previous article, when subjected to similar treatment, showed a tabulated crystalline structure, the crystals overlapping each other and placed very much like flag-stones are in a pavement. The mass was no longer dark, but showed an illuminated surface, or rather, a ring of light near the edge, which was not decomposed as from refraction, but homogenous in color as if reflected around the edge of the crystals.

The upper ends of the crystals in the harder metal were all truncated at various angles, and hence the possibilities for the phenomenon of reflection referred to. The same powers were employed in the latter case as in the former. Intermediate grades of iron showed modified results, but always in accordance with the above stated facts.

The difference in irons as shown by the microscope seems to be a dissimilarity of crystalline structure, rather than a variation of composition, although one is more or less dependent on the other.

Irons may be found of almost identical composition, but when submitted to the microscope will often show marked differences.

Thus may the microscope be used to supplement the chemical and physical tests in the iron foundry with most gratifying results.

A common instrument, providing it possess a substantial stand, may, with a C eye piece and a 1-inch and ½-inch objectives, be a very useful piece of apparatus to the foundry.

When used it gives a comparative test for each brand and grade of iron when a standard has previously been established, since the shrinkage can usually be very closely approximated by the experienced observer with this machine, providing the samples have been carefully mounted. The minute particles should be floated in the balsam, and the cover glass should not be pressed upon the glass while the sample is drying.

If used in this way its utility is greater than would be recognized at a glance. It must not be supposed that the few benefits of its use here cited are the limits of its possibilities, for the longer it is used, the more potent factor does it assert itself to be in estimating the value of an iron. And not in iron testing alone does its utility lie, but for foundries unequipped with a chemical laboratory it will prove most efficient in the examination of coke.

Pyrite can by it be detected, which always means objectionable sulphur and slate and dirt, which invariably produce a high ash. In limestone it may also be used for approximating the amount of impurity, and sometimes iron, but for the last purpose a more expensive machine than the one referred to must be used.

But for all ordinary work the machine as previously described is competent, but if an Abbie condenser, polarscope and high power objectives are available, the efficiency of the machine is just that much increased.

In concluding this series of observations upon the operation of mixing iron and the means necessary for the satisfactory accomplishment of this, the author believes that the best results will always be obtained by the unprejudiced use of both chemical and mechanical tests, and the constant ambition of every foundryman should be the variation of his processes within reasonable limits until he has found the best method of procedure in every possible case.

Shrinkage, chill and strength are all due to molecular arrangement within certain quite broad limits, and it is only as composition affects these that chemical analysis is of value. Since molecular arrangement is so active in the production of the beneficial or baneful properties of iron, it is possible that some chemical or mechanical process may be devised which it will be possible to give irons that are weak from the excess of some elements or lack of others, strength. This has been done on a small scale by tumbling and on a larger by the familiar process of annealing in the presence of some chemical, as it is now done in the malleable

iron foundries. The influence of small quantities of silicon and excessive sulphur may be either wholly or in part overcome by the addition of such qualities of aluminium as from one-tenth to one-fifteenth of a per cent.

Under no conditions should these two classes of tests be alienated, and only as each is used to the mutual advantage of the other will the most rapid advancement be attained.

Mitis Iron.

It is not generally understood that wrought iron can be melted and poured into molds, the same as is practiced with cast iron, but such is the fact, with certain modifications. By the Mitis process wrought iron is melted and then rendered very fluid by the addition of 3 to 5 per cent of aluminum. It is possible to melt wrought iron in an ordinary cupola, but it is not possible to render such melted iron fluid enough to run into molds without the addition of the aluminum as above noted. In the case of Mitis iron the melting is usually accomplished by small crucibles which are sometimes heated in kerosene furnaces. A long, low structure is built of brick, perhaps 50 to 100 feet in length, and from two to three feet square in cross sections. One end of this conduit is connected with the chimney, while at the other end the kerosene burner is placed. This burner may consist merely of a series of shallow pans placed one above another and filled with water. Kerosene is introduced drop by drop into the top of pan, and the pan being already full of water, the kerosene must spill over into the pan beneath. This continues from top to bottom of pan or until the supply of kerosene is driven off by the intense heat generated by its combustion. The oil becomes heated, vaporizes and burns as it falls with an intense, roaring flame.

The crucibles of iron are placed in a row inside the conduit, fully exposed to the flame; after the iron has become soft and pasty, the crucible is removed by means of a pair of tongs similar to those used in brass foundries. Then the aluminum is added and the crucible replaced in the furnace for a short time, when it is ready to pour in the usual manner. Mitis iron has a great number of useful applications and in many instances it is a close rival to the forgings made by drop presses.

GEAR MOLDING AND GEAR MOLDING MACHINES.

A Paper Read Before the National Foundrymen's Convention Held in Philadelphia, Pa., May, 1896.

By S. GROVES, M. E.*

When the philosophic historian comes to write the industrial history of the latter part of this Nineteenth Century, not the least important chapter will be the interesting story of the renaiscence of iron-founding; and when he endeavors to divine the causes which gave the momentum to this revival, he will probably point, in the first place, to the invention of the geared ladle by Nasmyth in 1838 as the first application of practical mechanics to the economic handling of material in the foundry; and, to the invention of the first gear molding machine by Jackson in 1855 as the primary effort of the iron founder to reduce his rule of thumb and guesswork practice to the exactitude and precision of a science. For many years after the invention of these initial appliances, very little progress was made in the adoption of labor-saving devices, and mold forming machines, for duplicate work. During the last decade, however, a marked change has come over the scene. There is as much difference between the foundries of Philadelphia today and the foundries of my boyhood, as there is between the miserable horse car—which is fast becoming a curiosity—and the brilliantly lighted, finely furnished and rapid running electric cars of our modern streets. Indeed, I was greatly tempted at this point to dilate upon the general subject of modern foundry appliances; but, inasmuch as the limited theme of gear molding and gear molding machines has been allotted to me, I must observe the discipline of the convention, and confine my remarks to this special branch of founding.

A year ago, it was my privilege to read before the Foundrymen's Association in this city (Philadelphia) an essay on "Machine Molding, with Special Reference to the Manufacture of Gears," in which I described with copious illustration the molding of gear wheels by machinery; contrasting this new

*Delayed in publication, owing to the loss of of the original manuscript.

and scientific method with the primitive custom of hand molding—by means of expensive full patterns. And since I can not report any new discoveries in this important branch of trade during the intervening twelve months, it only remains for me to supplement the generalities then stated with some particulars and practical details noted in the process of actual manufacture. It may be a startling assertion, but it is nevertheless a fact, that in no branch of the art of founding is there demanded of the molder more skill, patience, resource and intelligent perception of the laws of cause and effect than in the molding, say of a 12 feet double helical, split gear, weighing some 12 tons, in which the pitch diameter and depth of face must not appreciably vary, the teeth be equidistant, and so clean that neither file or hammer nor chisel must be used on the flanks of any one of them. And yet, with properly designed machines and experienced artisans, it is possible to approximate to this degree of perfection. I now proceed to describe the *modus operandi*.

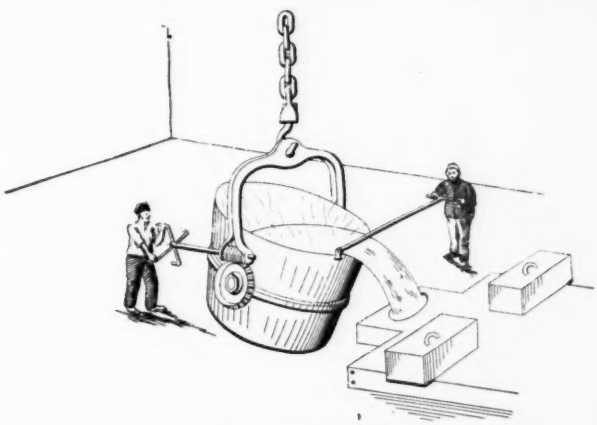


FIG. 1—NASMYTH'S LADLE.

Notwithstanding the manifest advantages of machine molding, it is astonishing to find how tenaciously some people cling to the antiquated. Take, for example, the molding of a worm for

WORM GEARING.

The common method of molding a worm is, to form the mold by means of a pattern made in halves. Now, these pattern halves can not be withdrawn from the sand direct, owing to the over-hang of the threads; they must be twisted out. Anyone who has tried to do it knows how difficult it is—patching and mending invariably follow. This trouble, together with the enlargement of the mold, due to rapping, added to the unsightly fin which appears on the casting at the parting of the pattern, renders this old plan altogether unsatisfactory. But the machinery molder has completely overcome these difficulties by bringing to his aid a simple mechanical appliance. A brass pattern is chased in the lathe, having the necessary allowance for contraction. This pattern, with tapered core print at lower end and tapped hole in top for receiving lifting rod, is set vertically in the flask, hand packed with suitable facing, rammed around, and strickled off. This done, a plate having hole in center of same shape and rake as thread of worm, also a cross bow with guiding gland in middle, is secured to top of flask. The lifting rod, with left-handed screw, is then inserted into the pattern, and the pattern screwed out of the mold up through the slot in cover plate, the mold of each thread being self-slicked in the process of withdrawal. The cope is then put on and the mold poured. Thus, by a simple method of machine molding, duplicate worms, perfectly smooth and true, can be cast in greatly increased quantities and at comparatively small cost.

SMALLER GEARS.

Again. Why endure the slow and costly process of cutting the teeth of smaller duplicate gears in the machine shop, when, by means of a cut toothed iron or brass pattern,

fixed on a draw-back mold forming machine, a laborer can make these gears almost as fast as a skilled molder can turn out the blanks! And what is more, the teeth will have the advantage of the hard skin for a wearing surface, which is removed when the teeth are cut out of blanks in a lathe.

We now come to the molding of gears of magnitude, and in dealing with this part of my subject, I may say, at the very outset, that when you know how, the molding of gears to say, 6 feet diameter on a revolving table machine is, like the machine molding of worms and small gears, a very simple process. A common laborer can soon be trained to do the work perfectly. After he has once made successfully, a spur, bevel, helical or worm wheel, the process in each subsequent case is very similar, and the man becomes practically part of the machine. When, however, we come to the machine molding of heavy wheels over 6 feet diameter—which must be made in the floor, and not on a table machine for fear of injuring it as an instrument of precision—then we are confronted with an altogether different condition of things. The common laborer is no longer available; the molder must be, in every sense of the word, a mechanic. Take, for example, a double helical gear 14 feet diameter 4½-inch pitch, made in halves by means of splitting plates. In the first place, there must be heavy anchor foundations, covered with a layer of sand, then a coke bed with vent pipes for conveying off the gases generated under the mold; then another layer of hard rammed sand, upon which is built a brick wall; and a point of importance is that these bricks should be porous. The portable molding machine is then fixed, sweep adjusted, and the mold bottom properly leveled and swept. Then commences the interesting process of machine molding the teeth. A laborer operates the drawback machine and index, inside the ring, while the molder, standing outside the wall, leans over, and rams the teeth. Here comes into play the skill and resource of the experienced molder, for, in selecting his facings, several important conditions have to be observed. The fine grained sands which he used for 1-inch pitch will not do for teeth 4½-inch pitch, the particles of silica in the sands must be coarser, in order to render the facing porous, and thus allow for the free exit of the gases; it must be sufficiently cohesive to mold well and resist pressure, and sufficiently refractory to prevent the burning action of the hot metal. Further, the molder, in ramming the teeth, must be able to judge exactly the necessary degree of force to impart to his rammer; the force applied in forming the tooth spaces for 1-inch pitch will not do for the larger sizes; and besides, the ramming must be uniform, since a hard spot here and a soft spot there, will tell its miserable tale when the gear is lifted out of the sand, either in unsightly scabs or ugly swellings, necessitating the use of hammer and chisel. And I may remark here that in molding the teeth of large gears of 3-inch pitch and upwards, it has been found necessary to vent the mold of each tooth space, by leaving an oblong hole in the middle, which is connected to the coke bed below by a vent wire and filled with fine particles of coke. Teeth molds formed in this manner afterwards coated with a refractory solution, and thoroughly skin dried,

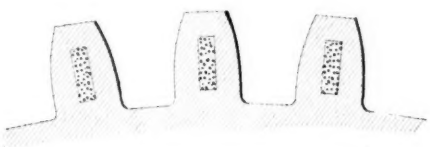


FIG. 2—MODE OF VENTING GEAR TEETH.

not by the erratic heat of a coal or coke fire, but by a steady, regulated gas flame delivered through small holes in a 1-inch tube ring—about 12 inches less in diameter than the mold—will produce teeth with sharply defined edges, and flanks bright, smooth and clean.

Another important improvement in manufacture is the substitution of green sand for dry sand arm cores. This is one more instance of necessity being the mother of invention. If a large gear is to be true in diameter, there must be no resistance to general shrinkage. The shrinkage which takes place in the arms towards the hub must be followed by the run between the arms also; anything which hinders this onward movement is detrimental to the diametral perfection of the gear. Hard-earned experience has proved that this is just what dry sand

cores are found to do: hinder normal shrinkage. I well remember a deplorable instance of this. It was a large gear, 7-inch pitch 30-inch face, and when cast, a number of teeth were cracked transversely across the face, midway between the shrouds. The use of dry sand cores was manifestly the main cause of this mishap, for the arms were of I section, and as the metal in the top and bottom flanges shrank in towards the hub, it naturally drew the rim and whole face of the gear with it; but the hard dry sand cores resisted this, hence the metal in the teeth opened out in the middle. From that time forth I discarded dry sand cores, using only hollow, coke-filled green sand cores, made of coarse gravel or gum sand; and in no instance was the old trouble repeated, for they adjusted themselves to the shrinkage of the environing metal.

Having described the method of forming the teeth molds, selecting facings, and mak-

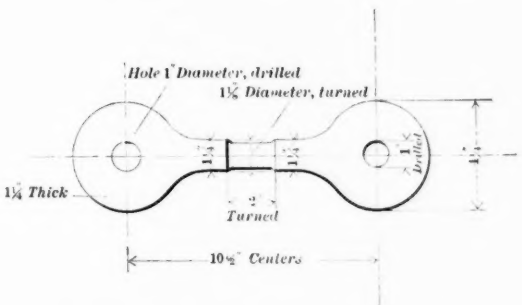


FIG. 3—FORM OF TEST BAR USED IN TESTING ENGLISH IRON.

ing the green sand arm cores, we now pass on to the question of covering in. In casting a heavy gear it is important that there should be no strain; the slightest uplift of the cope would cause the width of the face to vary and the gear to run untrue. With this danger in mind, flexible wooden copes have been entirely discarded as being liable to twist in lifting and bulge under pressure. Ponderous iron copes have also been altogether abandoned, both on the score of expense and difficulty in handling. The best makers now use strong dry sand covering cores exclusively, a system which represents a manifest advance in the art of molding large gears; it is safe, economical and expeditious.

Then there is the question of metals. If ever there was a case where test bars are a necessity, it is in the manufacture of gears, for the buyer insists upon a guarantee that the metal in the casting must stand a tensile strain of 30,000 pounds per square inch!

I may be permitted to say a word at this stage, relative to the discussion we have just had, upon the shape and size of test bars. If I did not take part in the debate it was not because I had no experience, for it was my good fortune to be engaged some few years ago in the systematic testing of almost every brand of pig iron used in the British iron trade, and I have here a record of over 1,000 tests, both transverse and tensile, which I conducted during the four years ending 1888. The form of test bar used was as shown in

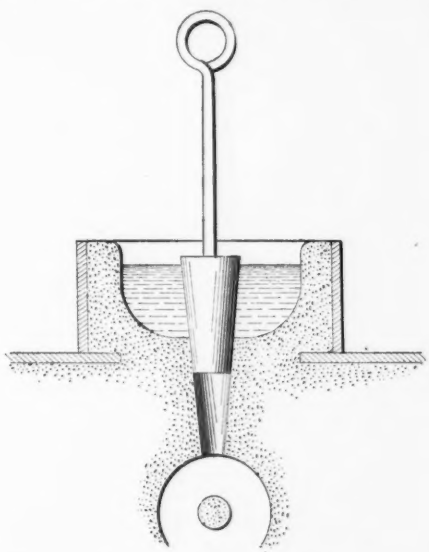


FIG. 4—STOPPER FOR POURING GATE.

Fig. 3: the middle was turned and the pin holes drilled perfectly at right angles to the center of the turned section, in order that the strain should be in the direct line of the applied forces.

There may be objections urged to this shape of test bar, but, in my opinion, it is greatly to be preferred to the square-ended test bars commonly used by American foundrymen, which are held in the machine between file-faced grips. After the faces of these grips become worn, slipping takes place, and I verily believe that many of the erratic records presented to us of tensile

tests is due to twisting and cross straining due to this defective system of testing. The only trouble we ever had with these bars was the congregating of blow holes in the narrow neck. This trouble was overcome, however, by ramming up the molds horizontally, but casting the bars vertically—pouring from the bottom. The pouring gate at the top (Fig. 4) was filled with the calculated quantity of metal, the plug was withdrawn and the metal rushed down the gate hole to the bottom of the flask up through the mold, carrying the confined air and gases before it, and thus insuring a clean casting.

The metal for a gear should be as close grained as possible, especially in the teeth, since a skin of fine grained combined carbon offers the best wearing surface; yet must not be chilled, as in many cases the shrouds must be turned, the hub bored and keyseated in the machine shop, hence must not be too hard for the tool. It is of vital importance, therefore, that the gear founder be capable not only of scientifically grading his facing sands to suit the varying magnitude of his castings, but, for a like reason, must have an exact knowledge of the selection of metals by analysis. A metal mixture containing 2½ to 3 per cent of silicon would be suitable for a gear of 1-inch pitch, but would be useless for a large gear of 7-inch pitch, in which the mixture should contain an average of about 1½ per cent of silicon. Another condition worth noting is, that if the casting is to be sound and the teeth sharply defined, the metal poured into the mold must be hot—at a high temperature. With lively metal the gases generated in the mold can be easily expelled, and owing to its fluidity shoots quickly out of the hub, along the arms, into the rim and teeth around the circle, filling every nook and corner in the mold, and producing teeth with the knife edge appearance which the gear molder who takes a pride in his work likes to see.

FIG. 5—GROVES' PATENT GEAR MOLDING MACHINE.

The only difference between the molding of large gears in the floor and smaller gears on the table machine is that in the case of the

latter they are manufactured in interchangeable cast iron flasks, both cope and drag, having perforated bodies, planed joints and carefully fitted double tapered guide pins.

The lecturer closed with a description of the operation of his own gear molding machine, on which a patent has since been granted. He paid a glowing tribute to the unselfishness of such pioneers as Nasmyth, Keep and West for contributing the results of scientific experiments to the benefit of foundrymen.

Stove Plate Scrap.

By CHARLES JOHNSON.

I notice in "Cast Iron Notes," January issue, an article on "Stove Plate and Machinery Scrap." I have had considerable experience with this class of scrap iron and thought perhaps I could give some information that might be of value to your readers. At one time I deemed it necessary that I ought to know the analysis of stove plate scrap. In order to get at this result I melted by itself five tons of stove plate scrap just as it came from the pile and poured the same into pig beds; at the same time I made a one-inch test bar from this mixture. I then took from different parts of the pig bed 12 pigs and drilled them. I then mixed the drillings and had the drillings analyzed with the following results:

Combined carbon	.96
Manganese	.21
Silicon	2.86
Phosphorus	.938
Sulphur	.123

The one-inch bar made from this mixture resting on knife edges 12 inches apart, at the extreme ends showed a breaking strain of 2,850 pounds. This mixture made a very close grain iron.

You will observe by the analysis that the combined carbon was very high (which would make a close grained iron). The silicon is high enough to make the iron fluid. The phosphorus about right to make the iron remain fluid so that this mixture alone would run thin castings.

The above analysis shows high enough in silicon to produce castings of sufficient strength and softness when mixed with the right pig iron. However, the castings should contain from 2½ to 3 per cent graphite carbon. To demonstrate the above I give you analysis of castings from a mixture of stove plate scrap No. 3 nagire pig iron and a high silicon iron:

Graphite carbon	3.00
Combined	.296
Silicon	2.25
Manganese	.315
Sulphur	.11
Phosphorus	.772

The breaking strain of a one-inch test bar 12 inches long, taken from this mixture, broke at 3,535 pounds, and the castings are dense and soft.

I have experimented a good deal on the analysis of iron and believe the only way to be sure of getting such castings as may be required is by first knowing the elements that will give the kind of iron required, then make the mixture on the analysis. If you have an iron that the carbon is in the graphite state the more silicon added the more brittle and hard will be the castings. Therefore, in using stove plate scrap with a pig iron very high in combined carbon and low in graphite carbon with high silicon iron, this will change the carbons into the graphite state if properly charged. When using stove plate scrap, it is very necessary that the phosphorus be low in the high silicon iron, as the phosphorus in the scrap is .938.. I therefore contend that stove plate scrap iron is better to use than machinery scrap, owing to the elements being more uniform.

I have experimented as to shrinkage of stove plate scrap and pig iron, and find that there is more loss from shrinkage in pig iron than in stove plate scrap. I have also found it safe to make an allowance of loss of silicon in combustion of 25 per cent. I think it safe to state that the average silicon in machinery scrap will not run above 1.50 per cent. I have also found that the other elements, such as manganese, phosphorus and sulphur, vary so much that you cannot compound a mixture with the safety that can be done by using stove plate scrap.

There is a great deal that can be said upon the analysis and mixture of iron, but will not go into any further detail at this time, but may later give you my views.

He is Fond of Figures.

James MacCash, of 619 Harris avenue, St. Louis, Mo., who has handled considerable pig iron has made some calculations as to the amount of horse-power developed by him in the performance of his duty. He has not so far expressed his power in foot tons, but with a persistent application of arithmetic and possibly even algebra, he may in the near future be able to define in a known quantity of energy what constitutes the, at present somewhat uncertain, measure and extent of a day's work.

Mr. MacCash makes a carload of pig iron the basis of his report. He figures that the car, which contained 26 gross tons, was composed of 1,050 pieces of pig iron and that in unloading this he moved through a space of 12 feet for each pig with this result:

Distance traveled, 12,600 feet; weight carried, 58,240 pounds.

After this he loaded 13 tons of pig iron on a wagon, but in this case he does not mention himself as having traveled any distance so, we infer that his movements were confined to lifting the pig from the ground and depositing it on the wagon. Assuming this to have been composed of 525 pieces and the average distance through which it had to pass to have been 6 feet we have:

Distance traveled, 3,150 feet; weight carried, 29,120 pounds.

Add this to former performance leaves:

Distance traveled, 15,750 feet; weight carried, 87,760 pounds; time, 5 hours.

This is equal to carrying 292.5 pounds 52.5 feet in one minute, or at the rate of moving 15,356.25 pounds one foot in one minute. As a horse power is the ability to lift 33,000 pounds one foot in one minute and taking it for granted that the power required to carry the weight is equal to lifting it would appear that Mr. MacCash had exerted a little over five-elevenths, or close to one-half, of a horse-power.

He writes that he is 62 years of age and weighs but 125 pounds, though we have been unable to take advantage of this in perfecting his figures. He also says that after eating lunch and resting half an hour he repeated the same task, but this does not enable us to make a better showing figuratively, because such things cannot be considered in the cold blooded calculations of horse-power. However, we think that Mr. MacCash's power of endurance would do credit to younger men and heavier ones too.

Against Convict Made Castings.

The Texas Foundrymen's Association, through its secretary, James T. Fuller, is doing very effective work in behalf of a bill, introduced in the Texas legislature by the Hon. John T. Browne, to abolish the employment of convict labor in industries, when the product comes in direct competition with the free labor of the state. The convict labor of Texas has been the worst foe the foundrymen of that state have had to contend against. Its abolishment has been advocated for years, and if the efforts of combined exertion on the part of the foundrymen removes this obstacle, one example of the benefits to be derived from organization will have been exhibited.

The Weight of Cast Iron Balls.

Of the numerous methods of calculation to be found in text books on this subject, none appears so simple as the following, given as an answer in "The American Machinist" to a question for a "formula by which the weight of a cast iron ball may be arrived at in a single operation":

The following is the simplest formula for the purpose that we know: $D^3 \times .1365$. The D, of course, stands for the diameter of the ball in inches. Say that we have a cast-iron ball 6 inches in diameter, what will be its weight? $6 \times 6 \times 6 \times .1365 = 29.484$ pounds.

The amount of iron contained in the animal tissues of a man weighing 150 pounds is about 100 grains, or a quarter of an ounce. Yet so important is even this small amount to the system that a difference of a few grains more or less may produce serious constitutional disturbance.

Sir John Brown, one of the first men in Great Britain to advocate the plating of war ships with armor, died on December 26. He was formerly proprietor of the Atlas Steel and Iron Works at Sheffield.

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

THE FOUNDRY

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THE FOUNDRY

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Trade Outlook.

That waiting policy, which has been in evidence and characterized the market for a long time past, has not entirely disappeared. nor does it seem to have lost control of the present situation.

One bright feature in the commercial horizon is the ability of the Americans to increase their foreign markets for raw material as well as the finished product. Of course the exporting trade can never in any way approach the grandeur of the home market under normal conditions, but with the congested avenues of trade found at home, liberal shipment of our products acts as a safety valve and gives us a certain relief, without which our condition would be more serious than has so far been experienced.

Several locomotive works are now engaged on export orders, of which that for 31 engines for Japan at the Rogers & Baldwin shops is most interesting. The number of locomotives exported in 1896 was 309, or more than 26 per cent of the total number built.

The reduction in the price of steel rails has been taken advantage of by many railroads, and will ultimately reflect itself in orders for other forms of iron consumed by these heavy patrons of the iron and steel industries, the reported sale of 27,000 tons of steel at Philadelphia being regarded as indicating the beginning of better things for these industries in the eastern market.

Notwithstanding the depression of the past year, which affected the iron manufacture, in common with almost every other industry, the output of American pig iron was less than 10 per cent smaller than that of 1895, which was the largest in history. The present year begins more auspiciously for the business, with an increased number of furnaces in blast over December.

The New England consumers are taking their share of stock. Prices are not higher though any greater demand is likely to make an improvement. The demand for Bessemer pig iron has really been greater than for foundry irons, as some of the largest steel works have taken very good orders and are in consequence placing good orders in turn for Bessemer pig.

The southern iron men have caused some surprise to their northern brethren by re-

maining away from the tariff hearings of the ways and means committee at Washington. This is in part explained by the following statement credited to Mr. Solomon Haas, president of the Sloss Iron & Steel Co.:

"We do not need a duty on iron. The Sloss Company is liable to ask for a reduction or abolition of the present tariff on iron rather than an increase. We undersell Scotch and English iron in its own country, and we can put our iron, freight paid, in New York, at the price of Scotch and English iron with the duty added at their furnaces."

The immense sales of Alabama iron for export during the past five months and the constant reception of orders for more, is credited with having effected this change of sentiment on the part of the southern iron producers.

The large volume of spring business in sight gives manufacturers confidence that with patience everything will be right, though at the present the advantage is in favor of the buyer.

The Government's Babies.

In our last issue we referred to the difference of opinion existing between the manufacturers of armor plate and Secretary Herbert as to the cost of producing this modern necessity. Many items were shown credited with charges, which we thought were much larger than occurs in other industries, though we left it for our readers to decide as to their propriety.

Along comes our contemporary, "The American Manufacturer," with some dessert that is apparently intended to leave a patriotic taste in our mouth. It says:

"The manufacturers of American armor plate need no defense. As the chairman of the naval committee has reminded the country, we were not able to make a ton of armor plate for our ships in 1886, but these firms, relying on the guarantee given by the government, put up plants at a great cost and now we can make the best plate in the world. This has been effected by the enterprise and American pluck of two concerns, and our government cannot afford to follow a picayune policy in dealing with them. They fully deserve the moral and financial support of the government. It may be that altered circumstances, accomplished improvements, and quicker methods make cheaper armor plate possible, but the American firms should not be asked to approach European figures. It is true that one concern has been compelled to do so, but this should not be done by the order of our own government. There is no telling how soon the present type of battleships may be discarded by the naval powers, then the plants put up by private capital will be worthless. The present generation remembers how the wooden war vessels of the entire world were in an instant doomed by the appearance of the Monitor and the immense cruisers of to-day may be also swept out by some great improvement. In all fairness, the makers of American armor plate should be liberally dealt with by the government, and in addition to a fair profit, they should be allowed to fully recover the capital they have expended in showing the world what American industrial enterprise can accomplish."

It might incidentally be mentioned that we are making a great many things to-day with which we were unacquainted ten years ago, and that without a government guarantee, too. Money is continually being invested in enterprises of a far greater magnitude than even a three million dollar armor plant, and it is our conviction that the parties now engaged in manufacturing armor plate were prompted a great deal more in establishing their factories by a desire to pocket a certain percentage of the shekels Uncle Sam is willing to spend to keep himself up-to-date than by the motive of appearing as examples of American pluck. If they are capable, as stated above, of making the best armor plate in the world, they will find no trouble in locating a market for their product, as this is what every nation is striving to obtain.

As for the danger of the plants becoming worthless by the discarding of the present type of battleships, this is nothing more than every manufacturer faces. There are a great number of decaying structures throughout the land that are useless because something better has been invented, though no claim has been made against the government for reimbursement. It is accepted as the inevitable.

We do not have much faith in the government engaging in industrial enterprises of any kind, as it is our belief that the highest

development is reached by giving individual ability free scope. In this instance it seems to us, however, that if the government is indirectly to stand sponsor for the success of the enterprise, it could have lost nothing by having assumed charge of it in the first place. In this way it would not only be unable to lose anything, but it could also have taken a hand in disposing of some of the profit, of which there appears to have been some.

In other words, if this government has indirectly assumed all responsibilities and paternal obligations, why should it not at the same time have taken the other things that belong to this? It is no trouble to show enterprise and pluck when someone else's money is ready to pay all expenses and competition is shut off. A government that could afford to invest fifty-seven million dollars in a comparatively short piece of railroad ought to be able to put up a three million dollar armor plant without spitting on its hands. It should not allow itself to pay double prices for anything in the name of patriotism. There is absolutely no reason why transactions between the government and individuals should be shrouded in sympathy and painted in patriotic colors. It is solely a question of business, of dollars and cents, and we confess our inability to associate such dealings with the thoughts of any self-sacrifice on the part of either. In any event, we consider that these young armor plants have advanced far enough so that it is safe to take away the nursing bottle.

Saving at the Wrong End.

We learn that the Secretary of the Navy has become convinced that it is necessary to employ a corps of civilian inspectors to serve as members of what is known as the steel board, and whose duty it is to supervise the physical tests made of steel material at the plants furnishing this and also at the places where this material is being used.

It is said that these inspectors will not in every case replace the naval officers, who have heretofore been detailed to this work, but will serve as practical experts, whose technical knowledge and experience in steel working will enable them to prevent impositions on the government.

Those in charge of affairs cannot be credited with having cultivated any great regard for the capability of government employes when mechanical matters are concerned. Brass buttons does not increase one's knowledge or fitness for holding a position.

The engineers of our warships have suffered many indignities at the hands of the line officers and the system has to a certain extent made an encroachment on shore. With all our civil service reforms the most important places have been obtained by those with a pull, and it has been no wonder that frauds could be perpetrated before their very eyes.

Military clothes have exerted too much influence in the selection of suitable inspectors, and if the Secretary has realized his mistake in continuing the practice, this has been brought about by some of the flagrant abuses to which his department has been subjected, and for which thanks can be given to the selection of men with heads full of algebra and very little knowledge of the work they were supposed to superintend.

The magnanimity of the Secretary is shown in his offer of rewarding first-class experts from $4 to $6 per diem. With a government using thousands of tons and millions of dollars' worth of steel yearly it is proposed to effect a saving in the cost of inspection. This can result in but one way: No practical men can be obtained for such a salary. It is surprising to us that a government so liberal otherwise should in this important matter attempt to secure the best of professional skill at a rate considerable below what is paid to the average shop foreman. A man that cannot earn more than $4 per diem as the head of an important manufacturing concern does not amount to much, and no capable person will apply for such a position at these figures. A responsible place of this kind ought to be worth as much as a political job, even if it does not carry with it so much wind jamming. This policy is not economy, it is saving at the wrong end.

A Novel Use of Cast Iron.

Diamonds are used in dressing diamonds; steel is employed in finishing steel, and an eastern shop has made the innovation of using cast iron lathe tools for cutting wrought iron, cast iron and brass. This may seem absurd at first, but upon reflection we

know that cast iron can to a certain extent be tempered by chilling. Being thus made harder, it bears the same relation to ordinary cast iron, which is comparatively soft, that one grade of steel does to another. It has been found that tools cast of a chilling mixture, with that part of the tool which performs the work chilled, will work better than the same tools made from steel, at least the shop making a practice of employing them finds that the workmen prefer them, which in itself is a recommendation that would not be given without being backed up with reason.

As many of our foundries are operated in connection with machine shops, it would take but a small outlay to test the claims of the efficiency of cast iron for this purpose. It is said that these tools, while proving superior on the softer metals, are unsuitable for working steel, a statement we can readily understand when we consider that the weakest metal must give away. The readiness with which tools of different shapes may be made, and the general cheapness of the process, are the advantages claimed. A careful investigation may prove the extent of their merit, something that may not have been thought of before.

Legitimate Credit.

When the executive committee of the Philadelphia Foundrymen's Association recommended the establishment of some kind of a credit system, it opened a theme that ought to prove as fruitful a source of good results as any other problem that has been brought to the attention of this organization.

Foundrymen will contract bad debts, just as the butcher and grocer, and in all such cases it is largely a question of individual judgment. As underwriters will take risks on overdue vessels in consideration of an increased fee, so many foundrymen will extend credit beyond the strictly legitimate limit if the customer agrees to pay above the market rate for castings. Such transactions are largely a matter of speculation in which the chances are supposed to favor the seller, though all failures will show an overrating of creditors.

The necessity for credit to facilitate trade is not questioned, but the safe limitation is as irregular as the individuals who benefit by it. As a bureau of information, as a commercial agency, to formulate the standing of the foundrymen's patrons, we can see in a committee appointed for this purpose much that would be beneficial to those who are willing to govern themselves in the matter of extending credit by its rulings, but the fact remains that in all lines of trade risks will be taken if the premium is large enough to cover what is thought to be the chances. Men will risk much to gain little, and the foundryman has in him the same love for the spirit of speculation.

It Makes a Good Showing.

The Engineering News in a recent number treats of "The Development of Local Engineering Societies" and the influence they exert upon their respective professions. The article is accompanied by a table showing time of organization, number of members, average attendance, etc. Out of thirty-four societies presented, but three show a larger average attendance than the Western Foundrymen's Association, which is credited with an average of 33.3 per cent of the total membership. This figure may appear rather small by itself, but in comparison with others and considering the fact that a great number of members reside a considerable distance from the place of meeting the showing is very good, especially when one considers the past condition of the trade in general.

Relating to this subject the same journal continues:

"The mutual exchange of knowledge in the engineering society is accomplished by the regular meetings of its members for the reading and discussion of papers, by the examination and study of engineering processes and structures through society excursions, and finally by the permanent recording of these meetings, papers, discussions, and studies in a printed publication. Without the meetings, papers and discussions the final publication can have no being, and without the publication the other things fail largely in their chief purpose. In their provisions for publication all but a few societies are perhaps amply progressive, but the same cannot always be said of their production of matter for publication. This results

partly from the disinclination of members to individual effort, and partly from the fact that when a member has developed a carefully prepared and valuable paper he prefers the wider circulation and greater prestige which its presentation before a larger and more powerful national organization, or in the columns of a widely read engineering journal, will give him.

"The latter condition is a natural one and one from which the local society must always necessarily suffer. The lack of interest among the members, however, can in a great measure be overcome by proper effort and upon the executive officers of the society rests the responsibility of making this effort. Perhaps this should not be the condition, but it is. The average member pays the dues, elects the officers, and formulates the rules of proceeding, and then steps back and waits for the wheels to begin to revolve, apparently unconscious of the fact that he is one of the wheels, and that if he stands still the other wheels have to overcome his inertia and friction besides their own. To the executive officers falls first the duty of securing papers and developing discussions, for if these be able and vigorous, attendance at the meetings and material for publication will supply themselves. In one of the most successful local societies of which we know, the executive officers outline broadly a series of subjects to be considered during the year, and then make a direct appeal and secure a definite promise from one or more members to present papers on some branch of each subject at a definite date. This being done, a still further appeal is made to various members particularly interested or informed regarding that subject to discuss orally or by letter the problems and practices considered in the paper. In operation this scheme has resulted in a distinct improvement in the characters of both papers and discussions and in the attendance at the regular meetings. In another prominent society a similarly successful plan is followed to get the full benefit from excursions to manufacturing plants and engineering structures. Some member is requested to present in written form all the impressions, information and opinions he may have obtained from his examination of the process or structure, and at a regular meeting this is read and similar information is solicited from other members. To show concretely the result of this plan of work, it may be stated that the society proceedings of 1896 are richer by about 65 pages of comment and discussion as the result of one excursion to examine the processes of two great engineering industries. It may be that a better plan than the one outlined can be devised, but this one has worked well, and above all, it has shown what definitely directed personal appeal and encouragement can do."

There are a great number of points well taken in the above. We have noted repeatedly not only that certain papers prepared by members and of direct interest to the trade were presented outside of the association, but also that a great many of the subjects treated at the meetings were brought forward by persons who were not members. Nothing could be more appropriate than the reference to the average member as "standing back waiting for the wheels to revolve," instead of considering himself part of the mechanism.

It seems, also, as if sight is sometimes lost of the fact that a paper, conscientiously prepared and of actual merit has a commercial value. A paper entitled to publication is generally paid for, so that there is to an outsider a pecuniary gain in turning the results of his observations over to a widely circulated periodical, besides the greater advertisement which this affords him.

A number of subjects presented at the meeting, especially those relating to improved appliances, partake more or less of the flavor of advertisements, when viewed in a broader light. We dare say that the most interesting discussions that have taken place before our foundrymen has been such, in which nearly every member felt at home and could take a hand. Unfortunately, we must look for such papers to the members who are usually the last to come forward.

The reference made to excursions to points of interest should prove applicable to the foundrymen. We know from experience that a great many shops have a great number of interesting and instructing points of shop practice scattered throughout them that are not brought out, because those connected with them have become so accustomed to their existency as to regard them as being

nothing but ordinary practice. With an occasional day off for the sole purpose of inspecting points of interest much material of considerable value would be gained that with a small amount of labor could be prepared as subjects for later meetings.

Krank's Korner.

The fact that some foundries are stingy in the use of facing sand may be pretty hard on the facing mills which grind the sea coal, but what a godsend they are to the shops that make steel brushes.

* * *

The use of a small piece of aluminium in a crucible of brass greatly improves the quality of the metal. Not only does it improve the fluidity but it acts at the same time as a flux, giving a metal that is free from the impurities noted in ordinary brass, thus furnishing a sounder casting.

* * *

While the molders' trade is being encroached upon by molding machines that are more or less automatic it should be noted that work is continually springing up that calls for a better mechanic than the one displaced by the machines. The tendency to cast machinery as nearly in one piece as possible, to save work in the machine shop, furnishes a higher grade of work for the foundry than formerly. This combining of parts often calls for the subdivision of molds into half a dozen parts or more and requires in the first place a very nice pattern and secondly a good flask with pins that will come together twice alike. Much of the trouble in meeting the demand for complicated castings is caused as much by an absence of suitable shop appliances as by the absence of competent mechanics.

* * *

In the extensive ways in which it may be employed, compressed air stands without a rival. Its utility is so great that we have only just begun to realize its possibilities. With a further introduction into the foundry it will make known its own adaptability to operations now performed by other means and prove itself to be one of the handiest things that has come into the shop..

While the discussion on the apprenticeship question is in a plastic condition, and capable of being wrought into other forms it may be well to mention one point that has seemingly escaped observation. All have agreed that when a boy shows an aptitude for the trade the way to reward him is to promote him to better work. But who suggested that along with his ability to do better work should come an increase in pay for his services? If a standard length of apprenticeship with a standard rate of pay is to be adopted, where is the incentive to outdo your fellowman?

* * *

Competition is essential everywhere. All the exertions we make are made with the object of receiving therefor more honor, fame or wealth than our brothers. Give humanity a standard in service and pay and where is the force that beckons us to make one more effort and then another? Standards may be all right in some things, but when you come to regulate the actions of humans by them, they cease to be a virtue. They assume to deal out to us by a system of equality an equal share of reward, when we are not created equal, when we are not capable of making ourselves equally useful. Why should we then be satisfied with equal rewards?

* * *

Under the stimulus of a differential rate of pay ordinary mechanics have over and over again surprised themselves in their increased ability. It is generally conceded that a mechanic does his best when he exercises every faculty in his possession to the utmost. This is impossible when a standard rate of pay prevails, because the operator is more or less engaged in watching his neighbor's performance. In short, instead of confining himself solely to his own work he is making comparisons with his neighbors, in order to equalize his output as to conform with that of others receiving a similar remuneration.

* * *

You may credit to piecework all the evils you want to, and yet piecework has done more to develop the latent powers of man than was ever accomplished by any standard of recognizing individual ability.

I have seen boys, I have seen men, working under standards of service and pay, killing time. To my question came the answer, We get just as much; look at so and so, he only does so much and he gets just as much as we do. Could such an answer be given with a system that did not throttle competition? You may point to whatever system you please and the only one that makes good men and good boys is one that permits the operation of a differential rate.

Philadelphia Foundrymen's Association.

The sixty-fourth meeting of this association was held at the Manufacturers' Club in Philadelphia January 6.

In presenting the report of the executive committee, Secretary Evans said that prices were lower in Philadelphia than in any other part of the country, car wheels being made for less than one cent a pound, and agricultural and general castings at prices below two cents per pound.

Attention was called to a contract, lately consummated by the city of Philadelphia, whereby it obtains the castings required for its water and other departments at a price less than 1½ cents per pound, being a reduction over last year's contract of 15 cents per 100 pounds.

Many foundrymen are holding aloof from the low-priced business, entirely content to let those who will fill up their shops with this class of work, looking upon such a course as one which will remove a lot of competition from the market, and make a good opening for better prices.

The question has arisen, continues the report, as to the necessity for a new credit system. It seems that certain people are buying castings at prices satisfactory enough and when their limit of credit is reached they withdraw their patterns and open new accounts with other foundries. This is a most reprehensible proceeding and it is worth while to consider a plan in regard to credits. Such a one has been successfully adopted by a sister organization (the Hardware Association). All defaulters in that line are reported to the secretary of the association, and when the defaulter applies to a house for a line of credit, notice of such application is given the secretary, and if non-payment of his bills is recorded against the applicant, the secretary notifies the member of such fact, thus preventing the opening of what would probably turn out to be a bad account.

Mr. Wanner made the only report from the price committee. He said that transactions in cast iron gas and water pipe were somewhat indefinite and at a low price.

At this point Mr. Evans mentioned a contract of 25,000 tons of pipe, to be delivered on the streets of Baltimore at $17.30 per net ton, which was taken by the National Pipe & Foundry Co., of Scottdale, Pa.

Mr. Asa W. Whitney read the paper of the evening on "The Transverse Strength of Chilled Iron as Affected by the Relative Directions of Stress and Chill." In it are embodied the results of several years' patient observation on the part of the author. Mr. Whitney illustrated his remarks with many samples of different bars, to which reference is made in the paper. Discussion on the ideas presented, which were more than ordinarily interesting, was deferred until a later meeting.

The secretary announced as a subject for discussion the question "What should be the temperature of core ovens to give the best results?"

Mr. Glover thought that the same question could be made to read: "Which is best, a fast or a slow drying oven?"

Mr. Rogers stated that the core ovens at the plant of Wm. Sellers & Co. were the best examples he knew. They are fired at one end and the heat passes off through flues in the floor, making the temperature nearly equal at top and bottom.

Mr. Schumann gave it as his opinion that the temperature of core ovens should be maintained at about 500 degrees. It becomes necessary to change the air quickly in order to get rid of the moisture.

Mr. Ellicott's experience had been, that in drying a loam or dry sand mold, if a slow fire was kept up for the first day, it was impossible to produce heat and steam at the same time. By increasing the temperature on the second day to between 400 or 500 degrees a much more satisfactory mold is obtained.

Mr. Schumann thought that different classes of work would require different treatment in drying, and that to assume such

a thing as a universal temperature was premature and out of place.

Mr. Wanner mentioned a number of improvements that had been made in the core ovens of the foundries with which he is connected. Better results had been obtained by regulating the fires, depth of furnaces, chambers and positions of draft.

Mr. Schumann spoke of core ovens employing the same method of drying as laundries, by forcing air through a cylinder filled with steam into the drying room.

Mr. Messick said they had tried this method, but without success, as they were unable to obtain a heat sufficiently high to accomplish the desired result. He would not advise others to attempt the heating of core ovens by steam.

Mr. Ellicott stated that after a trial with hot air they had been compelled to give it up, due to the low heat produced by this medium.

To the question "What is understood by gun metal iron?" Mr. Whitney replied that as far as he knew it had reference to such metal as would be used in making guns or gun carriages, the tensile strength specified being about 28,000 pounds. It is generally melted in furnaces, though metal melted in a cupola has recently passed as satisfactory.

Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, January 20, 1897, at the Great Northern Hotel, Chicago. In the absence of the president, the vice-president, Mr. William Ferguson, called the meeting to order.

By request of the chairman, Mr. Carver addressed the meeting as follows:

I am one of the new members, but I never belonged to any association in which I have taken so much pleasure and from which I have derived so much benefit as I have from the Western Foundrymen's Association. In talking with the different members in regard to their experience in foundry practice, I have obtained a great many new ideas, and I have got a good many ideas which I have found of practical value. I think if we could only formulate some definite plan for getting all the good there is out of the association, so that we can all get the benefit of it, we would be accomplishing the ends and aims that were designed by the Association of the Western Foundrymen. We have had some good papers here. They have brought out a great deal of discussion and have done a great deal of good among the members. I think that if we will each of us take an active personal interest and submit to our secretary suitable questions for discussion, it will lead to a variety of subjects being brought forth, and those questions being submitted to the association will give us the benefit of the experience of the other fellows. I am gratified to think that I have been a member of this association for the past year, and I believe that if proper steps are taken to present the association to foundrymen in Chicago and in the west in the proper light, that all of them will become active members, and if they can be prevailed upon to give it a little personal attention, we will derive a great deal of benefit.

Mr. Pettigrew—There is no doubt that it is a benefit to be connected with an association of this kind. I remember a good many years ago when we were molding the castings for a large steamship in the city of Glasgow, the foremen of the shops all joined together to get one another's views. I think by coming together and having regular topical subjects to discuss, we will derive a great deal of benefit. I must say that the foundries that I have been connected with are not much further advanced than when I was an apprentice. I think that we can get a great deal of good out of each other.

Mr. Ferguson—I do not agree with Mr. Pettigrew; I believe that there has been a steady advance in the foundry. It is noticeable to me since I was an apprentice at the trade. We can all refer to specially good molders in earlier days, but I believe that there was not as much required of molders in days gone by as there is at the present time. We have advanced and have kept pretty good pace with the times. The one thing that to my mind is chargeable for lack of advancement, is the lack of proper education among the men to make them mechanics.

Mr. Pettigrew—Now you are getting into talkable subjects. In my young days a molder had to serve seven years, and I claim they cannot make a molder in four years. And another thing, almost all molders that I have met here cannot go much farther than the rule of three. In my young days you could not find one molder in a hundred who could not do any problem in algebra. We have not the education among the molders that we had among the molders in Glasgow.

Mr. Moore—What the association needs is some one else to speak; that is, others to speak. I have attended these meetings since the organization of the association, and believe that one of the greatest needs of the association is general discussion and a disposition on the part of all who attend to take part in the discussions, to dip in their oars, to show a willingness to impart as well as receive information. This is one great need. We are perhaps short of practical men who have ability as speakers, but we should all do what we can, and when any one has any idea, let him give it out for what it is worth and tell what he knows. There are members who could prepare papers on special subjects, but so far they have not done so. I think we can congratulate ourselves on the way that this association, which was begun about three years ago, has grown and prospered. It has done better each year than the year before, and as an association it has undoubtedly been more prosperous than some of the members individually; it has had more money in the treasury at the end of each year than it has had the previous year, and I think that though it has grown stronger each year it yet fails to fill the purpose which we would like to have it fill. All that is necessary is for each one to chip in and do what he can, and above all he must speak up. If each one will come here, and each one say what he can on the subject of steel or iron, we will get a fund of information which will be of inestimable value to the association and to its members. That is what we want, good attendance and talk. I do not know of anything more important than that.

Mr. Sercomb—It is true I am one of the charter members of the association, and I also had the honor to be the presiding officer pro tem. of the organization. Although I have not attended many meetings lately, my interest in the association has not waned. Times have not been of the best, and my time has been taken up very much at home. I think that is about to be removed and the dawn of a better day coming. The material men are a part of this association; they come here to put themselves in touch with the foundrymen. This is a foundrymen's association, it is true, and I feel that the active foundrymen should be at the head, but the material men should have a voice in the meetings. I have taken full interest in the association. I know that it is a benefit to me to come to the meetings and get the experience and knowledge of the men we have here to-night. I think that what we need is full interest taken on the part of the different members, and when we take an interest we will get good papers. We will do a powerful good for the benefit of the iron men and the material men, and every other man who is connected with the iron trade.

Mr. Sercomb called attention to some amendments to the by-laws, which had been proposed by one of the members. After some discussion, participated in by Messrs. Moore and Sorge, it was decided to postpone further action upon this subject until later, when more time could be had for a thorough debate as to the merits of the proposed changes.

Mr. Vrooman—There is, down deep in the heart of every foundryman in this city, a feeling that there must be something else than mere discussion. There must be a financial benefit attached to this association to draw to it the members from whom you expect to draw your support. I believe we should establish a credit system to draw the foundrymen to us. There is not a foundryman in this city who would not gladly pay $100 if he knew that he was going to be benefited in a financial way. He wants something more than mere dry education. He is looking for dollars,, and this association can take up such a credit system, and I am sure that there is no foundryman in this city who would not give $100 a year if he knew that he could be protected from the people who get castings everywhere and never pay for them. I care not where I stand as to the associate and active mem-

bers, but I wish to say that which I think will be of the most good to the foundry business. As it was said here, it had been said that this was a supply man's association. The paper that was placed before the association on the question of classification I thought a good thing at the time, but to-day I believe that we were not in a position to classify the members; that the members of this association paying the like amount should receive the like benefit, and right to have a voice in the proceedings, and I think that the amendments as set forth will be a benefit not only to the association, but to the foundrymen in Chicago.

Mr. Sorge—Mr. Carver stated that steps should be taken for increasing membership. I confess that I have been trying to take steps, but have not actually taken them for the simple reason that I do not know how. They are simply so many questions. I would suggest that the members make it a point that if any special occurrence is observed by them that they write of it to the association. It is the best information that we can possibly get.

Pittsburg Foundrymen's Association.

The regular monthly meeting of the Pittsburg Foundrymen's Association was held last Monday evening, at the rooms of the Builders' Exchange.

After the usual routine business, the discussions were announced for the evening.

The paper entitled "Freaks of Foundry Irons," read at a former meeting by Dr. A. B. Harrison, chemist for the Clinton Iron and Steel Co., was discussed by some of the members. A communication from Alexander E. Outerbridge, Jr., of Mount Airy, Philadelphia, giving his view of the subject, was read by Secretary Zimmers. Robt. Taylor, of Taylor, Wilson & Co., Limited, of Allegheny, recited several cases of "freaks" which came under his observation, bringing out a statement from Mr. Dawes, of Dawes & Myler, of New Brighton, that the foundry trade was full of "freaks," and often carried on by "freaks." Jos. S. Seaman, of the Seaman-Sleeth Company, city, stated that he met with foundry "freaks" every day. All of his castings were large, and were unlike many of those of the foundrymen assembled. His best bars are made from plugs secured by means of a special and heavy drill. Some few years ago he erected a chemical laboratory; had the same fitted up with most improved appliances, and at a cost of many thousands of dollars. Here he analyzed his iron, but found his experience to be practically useless, and he afterwards disposed of it at a heavy loss. He told of having made arrangements with Capt. Jones, who for a number of years was connected with the Edgar Thomson Steel Works, at Braddock, to furnish him rolls for this plant, the understanding being that if they did not come up to expectations, they were to be replaced. The rolls furnished gave good results, until on a certain day, the captain called Mr. Seaman to his office and informed him that a certain pair of rolls furnished looked all right, but their analysis was poor. At the urgent request of Mr. Seaman the rolls were set and put in operation, and they gave better results than any other pair furnished. After this nothing more was heard from Capt. Jones upon the subject of analysis.

The secretary then read the following paper forwarded by Thos. D. West, of Sharpsville, on Dr. Harrison's subject: In a study of Mr. A. B. Harrison's interesting paper entitled "Freaks of Foundry Iron," on which you invite discussion, the writer regrets that some one size of a round test bar had not been adhered to and the same cast on end for all tests, for the reason that to reduce erratic results in the contraction or strength of iron to a minimum, we must confine ourselves to the use of one size of a round bar, and this bar must not be less than one square inch area, as less than this in size, square or round, is too sensitive to be affected by the slightest variation in the dampness of sand or degrees in the fluidity of metal to fathom phenomena or make the truest tests for every day use.

There are two points in Mr. Harrison's paper which the writer would call special attention to, the first is his reference to the difference in results obtained by applying the load on the "cope" and "drag" part of test bars. As far as the writer's knowledge goes, he was the first to discover this distinction found by such methods of testing, and which were given in a paper before the Western Foundrymen's Association, June, 1894. The

only difference between Mr. Harrison's results and the writer's on the above tests exists that he states the strongest records were obtained by having the "drag" side uppermost, whereas, with the writer, the reverse results were obtained. It is not possible, in the writer's view, for such a difference to exist, and either he has been wrong in noting which side was up when testing, or Mr. Harrison's statement is incorrect. The second point, which interested the writer, lay in Mr. Harrison's finding that the "tumbling" of test bars had removed the difference which had existed in the strength of the "cope" and "drag" side testing. This point made by Mr. Harrison is a new one and should be followed up, as if such proves true in all cases, it may have a greater bearing in leading us to explain some phenomena than anything that has been lately developed on cast iron.

The plan of testing the fluidity of metal described by Mr. Harrison is one followed by some, which from my experience has not proved very satisfactory, as without the greatest of care and good judgment, the slightest variation in the dampness of the sand and handling of the ladle when pouring can make a great difference in the length which such fluidity testing strips can "run" or be "cold shut," etc., as cited. Experienced stove plate founders know that the "running" of stove plate is often as dependent upon the method of pouring or handling the ladle, as upon the fluidity of the metal used, and heavy work molders know that any variation in the dampness of sand is not as effective in chilling, scabbing, etc., of metal on the cope side of a mold as on the bottom of them. For these reasons the writer some time back, devised and adopted, as shown in a paper before the American Institute of Mining Engineers, held in Pittsburg last year, the plan of connecting fluidity strips with vertical poured test bars, and has found the same to give results in denoting true degrees in the fluidity of metal to most closely agree with what the eye of an expert in judging molten iron would affirm as correct.

If Mr. Harrison had used a two or three square inch area round form of a test bar, cast on end, to obtain the contraction and strength of his iron with the above-cited plan of fluidity strips attached, he would have found very little, if any, freakishness. The sooner the foundry world ignores the use of small bars or those below one square inch area and cast flat, and adopts the round form of one or two or three square inch area cast on end, the sooner will it find freakishness to disappear and stability to take its place.

The subject of sulphur in iron also received some attention, especially from Messrs. Taylor, Dawes, and Kepler. Mr. Taylor spoke of a method adopted by his firm of throwing water over the coke before charging, and this at a certain time, for the purpose of washing out some of the sulphur. He suggested the plan of putting the coke in a place exposed to the weather to eliminate the sulphur as far as possible. Mr. Zimmers spoke of using water on coke at the ovens for quenching purposes. In districts where dry seasons occur, the coke makers would use water tanked up for some time, thus making the coke to be high in sulphur. The question was discussed at length by others.

The following paper by Thos. D. West, on "Regulating Foundry Mixtures," was read by the secretary:

It is to heavy founding that we must chiefly look for the best opportunities for obtaining knowledge of the manner in which the various metalloids affect the carbon in giving characteristic qualities and in changing the grade of iron. This arises from the simple fact that in heavy founding, castings of all grades are demanded. Then again, in order to obtain accurate information, we must deal with actual practice, for physical conditions in founding can often affect the character of iron or the condition of its carbon as much as changes in its chemical composition. Tests of iron from a crucible, etc., are of little value in advancing practical knowledge and have only created confusion of methods and ideas on the effects of metalloids. This has gone to such an extent that many seekers after information upon the metallurgy of iron are more confounded than enlightened on many points.

Some advise regulating the mixture or changing the "grade" of the iron by means of alterations in the percentage of silicon; others by changes in manganese, and again others by changes in phosphorus. To illustrate the effects of these elements, and as a demonstration of what I consider the best base for regulating mixtures, I would carry all back to the making of iron. I would con-

sider what are the constant and what the changeable metalloids, in order to discover what elements are really responsible for changes in the character of pig iron, as it comes in "brands" to the foundry yard. If, in making iron, all the metalloids remained fairly constant, not varying in the percentages, one "cast" after another, we could obtain a uniform product and have no such thing as grades of iron from like mixtures of ore, fuel, and limestone. But this is not what exists. Instead of uniformity we find that a furnace cannot at the present stage of furnace advancement make two "casts" alike, and hence we find that any furnace will, from the same mixture of ore, fuel, and limestone, give a wholly different "grade" or analysis of iron at almost every "cast." Now, the question simply narrows itself down to this. Are there metalloids that cannot be controlled? Are there those whose erratic action causes a diversity in results? Experience answers, "Yes," and analyses prove that silicon and sulphur are the metalloids wholly responsible for creating the difference in grades of iron, coming from similar mixtures of ore, fuel, and limestone in smelting, from the fact that the total carbon, manganese, and phosphorus generally remain practically the same, one "cast" after another.

When making the iron, silicon and sulphur jump around in such a lawless manner that the most radical difference may be expected in "grades" in various "casts." A furnaceman can be most particular and have all conditions alike, so far as is in his power, yet for all this no two "casts" will be exactly alike in silicon and sulphur contents. Now if it were in the power of the furnaceman to maintain the same uniformity in the silicon and sulphur that he generally secures in the case of total carbon, manganese, and phosphorus, there would be no difference in the grades of iron, and all would be practically the same in physical qualities. In all that I have written on this subject, I have made silicon and sulphur the basis of calculation and have contended that as much importance should be attached to knowing the percentage of the one as of the other. I still maintain that this position is correct and that this is the right practice to follow. In making iron, the furnaceman can control the percentage of manganese or phosphorus in his iron by his mixtures of ores, fuel, and limestone to obtain practically any specialties he may want, whether of high, medium, or low manganese or phosphorus iron. What little variations may occur in the percentages of these two metalloids in irons will have no practical effect on the carbon to change the "grade" or the character of the iron coming from one mixture of ores, fluxes, and fuel.

It is to be remembered that I do not claim that manganese and phosphorus cannot affect the carbon or the character of iron. Either of these can change the physical qualities just as variations in the percentages of silicon or sulphur change them; but we must look to the furnaceman to do this in preparing his mixtures of ores, lime, and fuels in making the iron. If any one desires an iron high, medium, or low in manganese or phosphorus, he can generally get it so even in his percentages as not to affect, in a practical way, the "grade" or physical qualities of the iron which he desires to obtain, and this can generally be achieved, day in and day out, at every "cast," as long as the furnace continues to use the same ores, fuel, and flux. On the other hand, silicon and sulphur will vary at every "cast," in spite of all the present furnacemen's calculations, and it is the changes in these two metalloids that we should consider as affecting the "grade" of iron, or in causing it to vary in its percentages of graphite or combined carbon. This makes evident what are the metalloids that the founder should recognize as basis for changing the "grade" of his mixtures of physical qualities obtained in the castings produced.

Although furnaces are unable to control the silicon and sulphur in always being uniform at the present day, the author has faith that future advancement of practice in attaining more uniform temperatures steadily in a furnace will bring about a great improvement in this line; nevertheless, silicon and sulphur will always be the metalloids subject to change the "grade" of iron where the same ores, fuel, and fluxes are used, and be the elements to which the founder should look for making variations in the "grade" of a furnace product, working on one brand of iron, or in making or altering mixtures for the founder in remelting iron.

The fact that silicon is important in regulating and softening mixtures was first suggested by Dr. Percy some 35 years ago, but it awaited experiments in 1885 by Mr. Charles Wood, a founder of Middlesbrough, assisted by John C. Stead, the expert chemist, both of England, to first practically demonstrate the value and utility of silicon as a softener and its application to founding, a work which, it should be said, had its foundation laid in experiments conducted by Prof. Thomas Turner, at Mason College, Birmingham, Eng., the same being presented a few months later at the Glasgow meeting of the Iron and Steel Institute. The extensive publication of this paper is really responsible for the universal adoption of silicon as a softener and partial regulator of mixtures in iron.

It is intimated above that the total carbon is not perceptibly altered where the same fuel, ore, and limestone are used when making iron. This is to be understood as referring to iron being made under normal conditions which insures a furnace running without having any "slips" or factors to cause an excessive cold or hot working furnace. The opinion of a few furnacemen with whom I have discussed this point is to the effect that the higher the temperature and the more slowly the ore passes down to the hearth as iron in a fluid state, the greater carbon will be found in the iron. This is to be taken only as an opinion, based on good reasoning, as I have failed to find any furnacemen that have followed these relations by exacting analyses to know positively what radical changes in the temperature of a furnace or the speed of reduction would make in the total carbon, where the same ores, fluxes, and fuel are used. However, what slight changes may be made in the total carbon by normal working of a furnace can have little effect in changing the "grade" of an iron; and this leaves us to recognize the silicon and sulphur, as stated above, to be the metalloids chiefly responsible for giving us "grades" in iron from similar mixtures of ore, fluxes, and fuel.

Before adjourning it was decided to invite all the foremen of foundries to come into the association and learn of the different methods of improving foundry work and of getting better results in every way possible. The foremen would certainly be as much benefited by attending as the proprietors themselves, and a cordial invitation was extended to all. The paper of Mr. West will be discussed at the next meeting, which will occur February 22.

Aluminum is little acted upon by mineral waters, and withstands the action of sea water better than iron, steel or copper.

The Chicago Pneumatic Tool Co. have received an order from London, Eng., for forty of their "A" size hammers, to be shipped during the first four months of the year.

At the Hickman furnaces in South Staffordshire, England, machinery is being put in to pulverize the slag; the object being to utilize the phosphoric acid which it contains in the manufacture of fertilizers.

Mr. John Pettigrew, who for twenty-five years has been connected with the Illinois Steel Company's foundry at Joliet, Ill., is now in charge of the John Featherstone's Sons foundry, Chicago.

The earliest discovery of iron within the present limit of the country was in the mountain range of western North Carolina, and the first effort to manufacture it into merchantable form was made in the State of Virginia in 1619. The foundry was destroyed by the Indians in 1622.

The Colvin Foundry Co., of Providence, R. I., advises us that the report of a fire in their foundry is incorrect. The fire occurred in the building of the National Elastic Web Co, part of which is occupied by the Colvin Foundry Co. for storage and office purposes, and has no connection with the Colvin foundry proper. The damage sustained by the Colvin Foundry Co. at the place of fire was very small.

One of the best trade papers published today.

FR. SCHWALE,
Rochester, N. Y.

Jules Buchel.

That a man is largely the maker of himself is exemplified in the career of Jules Buchel, the president of the Buchel Brush Co. and one of the owners of the Buchel Machine Works at New Orleans, La. Born in that city in 1865 and only receiving a common school education, he has already accomplished more than most men do in a lifetime.

He never attended a technical school, but being a hard student and an indefatigable worker he acquired not only a thorough mechanical education, but is also well versed in the sciences, particularly electricity and chemistry. After having served an apprenticeship in a local machine shop he started a shop of his own in 1887 with practically

no capital, which soon secured a very high reputation for the accuracy of its work, originality and progressiveness.

In the diversified field which Mr. Buchel has covered we are chiefly interested in the machine, bearing his name, for making wire brushes, which, with the attention of one boy, is capable of turning out 1,400 finished brushes per ten hours of such a uniform quality as to distance anything heretofore attempted in this line. Lack of space prevents us from taking up the details of its construction, which embodies numerous principles as intricate as they are ingenious. An examination and trial of the product is enough to convince one of its merits.

The Buchel Co. maintain a model shop in point of cleanliness, order, system and equipment and have found that men work with more zest under these advantages. They say that when a slouchy mechanic enters their employ he either improves or leaves.

On account of his various talents and inventions Mr. Buchel has been admitted as a Fellow of the Society of Science, Letters and Art of London, England. He is a creditable son to the new south.

Coke Production for 1896 in the Connellsville District.

The total of Connellsville coke production in 1896, as given by the Connellsville Courier, was 5,411,602 tons. The output of 1895 aggregated 8,244,438 tons. This was the banner year of coke-making in the Connellsville region. Notwithstanding the largely decreased production, 1896 was a more profitable year. The price of coke and the wages of labor were higher. During 1895 coke had been advanced by successive stages from $1 to $1.60 per ton, the average price for the year being $1.23, and the aggregate production yielded a revenue of $10,140,658. With the advent of 1896 the price was advanced to $2, at which point it was steadfastly maintained by the H. C. Frick Coke Co., which now owns and controls all but about 15 per cent of the productive capacity of the region exclusive of the ovens of the furnace interests whose product does not enter the market. The lesser interests sold under the market and the $2 rate was necessarily shaded some.

In our last number we recorded a member of the Smith family with the initials of J. D. as having started a foundry at Alamosa, Colo. It is needless for us to state that J. D. Smith, the foundry supply man, is not the individual who has been guilty of increasing competition.

Mr. E. B. Seidel, who for many years has acted as manager of the Philadelphia Black Lead Crucible Works, severed his connection with that firm at the beginning of the year, and is now erecting a new plant at Tacony, Pa., to be known as the Tacony Crucible Works, which will be ready to supply the trade about March 1.

Closed and Open "Feeding Heads" and "Risers" in Pouring Castings.

By THOMAS D. WEST.

Mr. Robert G. Moore, a veteran of 60 years' experience in founding, has, in a very friendly way, criticised a few points found in "American Foundry Practice" in the last issue of THE FOUNDRY, which I take pleasure in answering.

The first point which he considers an error is that of my advising "feeding heads" and "risers" to be kept airtight in green sand molds. I always endeavor, as far as possible, not to write anything unsafe to practice. I never knew of a green sand casting to be lost by reason of keeping the "feeding heads" and "risers" airtight, but have seen scabbed castings and metal from many molds go toward the roof by reason of not doing so; thus, of course, causing bad work and often heavy losses in founding.

There is a large class of work in small and medium size castings that can admit of "feeding heads" and "risers" being kept open with very little, if any, danger of ill results being caused thereby. I do not think that it is this class of work Mr. Moore has reference to. The chapter treating this subject which he criticised is entitled "The Drawing Down of Green Sand Copes," and mainly deals with a heavy class of work. I do not know how heavy a class of work Mr. Moore has had experience with, but I certainly do not think he can find any experienced in heavy work that would indorse the practice which he advises. In order that all may clearly understand the sense of the lines which he has criticised on this point, we here give an extract from that chapter, which reads as follows:

"The surface condition of a green sand cope, while the iron is being poured into a mold entirely depends upon the mixture and nature of the sand, and the heat it is subjected to. Any section of a cope surface that is exposed to the direct heat of the metal for over twenty seconds requires the sand to be strong and close and gaggered well, having as little sand under the gagers as possible, to keep the sand from being drawn down. I noticed in a recent issue of the American Machinist, the assertion made that with a plate 2″ or more in thickness, the cope will be baked hard as a brick, before the iron reaches it. I only wish that such was the case, for it would save work and anxiety for the results of many large castings. I have made molds in green sand that were not safe to cover with a green sand cope, fearing that the green sand would draw down. This is caused by the sand exposed to the heat beginning to dry and dropping down on the rising iron, which, when the casting comes out, shows lumps and sand holes in the cope part. There are several ways of securing a cope surface, to a great extent, from drawing down. For instance, mix some flour in your facing sand (about one to 16 or 20), or wet your sand with clay wash, and before closing the cope sprinkle the surface over with molasses water or beer.

Above everything, keep your risers and feeding heads airtight, so that there is no chance for the air in the molds to escape except through the venting and the sand. Then the rising metal will compress the air above it sufficiently to prevent the sand being drawn down by the heat, if the mold is not too long in filling up, so that the pressure is released by the air having time to escape through the vent holes and the sand. There is also such a thing as pouring castings too fast, so as not to give the air a chance to escape as freely as it should, thereby lifting your riser cover and weights and letting the air rush out and start the mold blowing. I have made castings where I have nailed the surface of the cope over with nails, keeping the head about ⅛″ below the surface of the sand, and in some cases have had the nails even with the face of the molds so as to insure the cope against being drawn down. When not feeling sure of this, I have made the facing sand strong with flour, and very damp with molasses water, building a fire with shavings and chips under the cope, until the surface of the mold was dried like a dry sand mold. When I thought that none of these extra precautions would keep a green sand mold from getting dry or burned, so as to draw it down, would then use a loam or dry sand cope or covering."

Not only is it essential to keep the feeding heads and risers closed on heavy work and many jobs of medium size in green sand molding, but often also on dry sand or loam work, an example of which is illustrated by a very prominent foundry a few years back,

making some large fly wheels having a rim about 8" deep, with a cope surface of one foot wide, which were covered with loam plates and cores. When first starting to make these castings, great trouble was experienced with the drawing down of the sand composing the cope covering, although everything imaginable was done in making strong mixtures of loam or sand, etc., in an effort to stop the trouble. Being solicited to visit this foundry, to assist them out of the difficulty if I could, I observed that all the feeding heads and risers were covered closely, but that no attention was being paid to making the joint airtight, which resulted in releasing all pressure of the expanded air against the cope surface, thus permitting the direct heat of the metal to burn the surface of the cope's covering and with nothing to support or hold it up, naturally, from force of gravity, fell down upon the rising metal. I told this firm if they would make their joints airtight, as well as their risers, their trouble would cease, and I had the pleasure of being informed that my instructions in being followed had proved successful in ending their troubles with the drawing down of the cope covering. I could fill the whole of this journal with recitals of cases demanding that risers, feeding heads, etc., should be kept airtight, and my experience in heavy founding causes me to be very emphatic in saying I do not recognize it as an error in advising what I do in the necessity of keeping feeding heads, risers, etc., airtight for the class of work referred to in the chapter criticised.

With reference to my work, claiming soft iron will melt easier than hard, must be an oversight on Mr. Moore's part, for if he will kindly turn to pages 291 and 304, he will find that it distinctly infers that hard iron melts easier than soft. I shall take pleasure in going with Mr. Moore into whatever points he may desire to discuss with me or think me in error in defining, but must say that so far he has not advanced any experiences to cause me to change the sense of the statements he has criticised. As this one point has already taken too much space, I will be heard from on the balance of them in the next issue, or at the pleasure of the editor in giving me space.

Removing Paint by Sand Blast.

Removing old paint from metal surfaces in structural steel and iron work—bridges, for example, and the like—previous to repainting, involves an expenditure of time and money quite beyond the conception of any one who has never given the matter serious consideration. Whether the sand blast, which is so efficient in cleaning castings, would perform satisfactorily in this direction is, therefore, a question of considerable economic interest. Whatever experiment has thus far been made has shown, what was to be expected, that when the paint is reasonably new and the oil is in a slightly elastic state, it is exceedingly difficult to remove it by sand blast, though later, when the oil has become more oxidized from longer exposure to the air, it yields more readily to the attack of the process. Paint, therefore, which is old enough to warrant its removal and replacing by a fresh coat, would probably give way before the sand grains in an encouraging manner. In one instance the sand blast was used to clean between decks of a cattle steamer, which was in an exceedingly bad condition, with many coats of old paint on the iron work. The results were highly satisfactory as to quality of work done, but the time consumed was excessive. The air pressure used was, however, only about ten pounds per square inch, and it is, therefore, reasonable to suppose that if, say, from forty to fifty pounds pressure had been used, the results might have been satisfactory in point of both quality and economy of work. At any rate, it would seem worth trying the process further. The promise of money saving that it holds out is certainly seductive.—From Cassier's Magazine for February.

Cast Iron Tools.

The Pennsylvania Railroad is using, at its Altoona shops, lathe tools made of cast iron. The iron used for these is the same as used for car wheels, and the cutting end is chilled and ground. It is said that the tools work very well in wrought iron, cast iron and brass, but will not stand the work on steel. The advantage claimed for them is their cheapness, and that they are of more uniform shape and size, and it is said that the men prefer to work with them.

CAST IRON NOTES.

Devoted to Inquiries from Practica Foundrymen on the subject of Melting and using Cast Iron. Address all Inquiries to W. J. KEEP, care of The Foundry.

What Book Will Tell How to Mix Iron?

There has been no book published on this subject. For heavy castings very little silicon is needed, but for light castings enough silicon must be present to keep the castings gray and soft. Pig iron from any furnace, or any scrap can be used provided the necessary silicon is present or is added. This can be done by adding No. 1 or No. 1 soft foundry iron or a small quantity of silvery iron.

Blow Holes, Shot and Spongy Spots.

"I send you several samples of castings about ¼" thick. There are several small shots in holes and in two samples there are spongy spots. We think the silicon is about 3 per cent."

Answer—From the way you run your work it seems as though the shot came from the iron spattering when it first drops down the deep gate. If the iron can be made to flow down along a surface instead of a direct drop this may be avoided. For such castings 3 per cent silicon seems a little too high and this may be the cause of the spongy spots. If they come from dirt, cannot you throw a little sand over the surface of the iron in the ladle and thus make a tough skin that will catch and hold the dirt?

Loss in Remelting.

"What should be the loss in a cupola melting 25 tons and what amount of good castings?"

Answer—For stove plate 60 per cent of good castings is doing well. The rest will be sprues and poor casting. With smaller castings having more sprues the yield will be less. The reported loss in melting depends upon the honesty of the melter. The weighing of materials is often carelessly done, and when weighing is done on the scaffold the report often shows no loss. If you will weigh everything that goes onto the scaffold for a week you will find from 2 to 5 per cent of loss.

Influence in Annealing Castings.

"If a casting is heated to a cherry red and cooled slowly, will it be as strong as before?"

Answer—The grain will be more open and the casting will contain more graphite. The casting will increase in size. If it is held at a cherry red for some time or is heated several times, the size will increase each time. The casting will be softer. Annealing of castings consists in heating them to a cherry red—holding the heat for six or eight hours and then cooling gradually. It is doubtful whether the slow cooling is of any use. The change takes place only when the heat is at a cherry red or what would be a cherry red in a light room when shielded from the direct rays of the sun. This would be a bright red in the furnace.

How to Prevent Cold Shuts and Slag in Castings.

A number of samples were sent me. From the appearance the iron was cold. As the castings were large and thin, it is important to get the iron in the mold as quick as possible. If the gate is kept full, dirt should not find its way into the mold, for when the iron is hot the dirt will rise to the highest point.

For thin castings like hollow-ware, the iron should contain enough silicon to make it fluid.

Phosphorus causes iron to remain fluid in the ladle and while filling a mold. Thus by increasing phosphorus cold shuts will be lessened and slag will have time to reach the surface of the casting. It is well to keep phosphorus near 1 per cent for light castings.

Black Heads and Slate in Coke.

"We made complaint to shipper, of black heads and slate in coke in large quantity, with this reply: Blackheads could do no harm since they are in all coke. As to slate, that would have to exist in coal before it could exist in the coke, and as it does not exist in the coal it could not exist in the coke.

I send you a sample of the material we call slate. A car of coke contained many hundred pounds of it."

Answer—For foundry use 72-hour is preferred rather than 48-hour coke. Black heads are partially coked coal, and I never heard it claimed that they were as good as coke. If each car contains the proportion of black heads that came from the oven in 72-hour coke there would not be enough to influence cupola melting.

All coal contains more or less slate, but there should not be enough in the coke to attract attention. A manufacturer of coke who says that there is no slate in the coal which he mines has something to learn if he believes what he says.

The sample received was pure slate, and if there was anything like the quantity named and black heads so abundant to attract attention, it would be safer to order the next supply from another producer.

Steel for Castings.

The properties of steel for casting depend so much upon the careful proportioning of carbon, silicon and manganese, that it is important to metallurgists and steel founders to ponder well the lecture on this subject recently delivered by Prof. Arnold. A mild steel, or in other words a steel only slightly removed from good wrought iron, consisting of iron with 0.21 per cent of carbon, stood a maximum tensile strain of 24 tons per square inch; but if 1 per cent of manganese and 0.25 per cent of silicon were added, the resistance went up to 33 tons. If the pure steel were hardened, the tensile strength went up to 34 tons, but if the steel containing the manganese and silicon were hardened the resistance and tension went up to nearly 100 tons per square inch. This shows what an important part the addition of a small percentage of manganese and silicon play in increasing the strength of mild steel. When carbon was added up to 0.45 per cent the steel reached a critical point, and any excess over that rendered the metal much too hard for steel casting.

The Derwent Foundry Company, of Ellwood City, whose plant was destroyed by fire a few weeks ago, is making efforts to secure a location elsewhere. Reports from Youngstown, O., state that the company is desirous of securing ground at that place.

Among the Foundries.

Robert McCool will erect a foundry at Victor, Colo.

The Alamosa (Col.) foundry has been completed and is in successful operation.

The new foundry of the Slaymaker-Barry Co., of Connellsville, Pa., is about completed.

The Arcade Manufacturing Company, of Freeport, Ill., will soon put in a brass foundry.

Lang & Shoraman, of Marshfield, Wis., will build a new foundry and machine shop in that city.

The Weir Stove Co., of Taunton, N. J., is contemplating adding another building to its large plant.

The Thomas D. West Foundry Co., Sharpsville, Pa., is enlarging the capacity of its foundry.

The new plant of the Indiana Steel Casting Co., at Montpelier, Ind., has been put into operation.

The Lapham Foundry at Plymouth, Mass., is increasing its plant by the addition of another furnace.

The Colorado Fuel & Iron Co. is considering plans for the enlargement of its steel plant at Pueblo.

The Wierd Foundry Co., of 266 Monitor street, Brooklyn, N. Y., are adding an extension to their foundry.

The new malleable iron foundry recently put in by the Gould Coupler Co., at Depew, N. Y., is in successful operation.

The new Sullivan foundry and marine engine works, at Sing Sing, N. Y., are rapidly being made ready to begin operations.

W. B. McLaughlin has purchased the interest of W. H. Mills in the Enterprise Foundry Co., of Muskegon, Mich.

The Shaw Steel Casting Co., of Milwaukee, Wis., has been incorporated by M. Abraham, Sol. Shaw and Louis W. Shaw.

The Ohio Iron and Steel Company, of Youngstown, O., have begun the erection of ten new openhearth steel furnaces.

Herr & Ronian have leased the foundry at Lock Haven, Pa., and have made preparations to do all kinds of foundry work.

The building for the Pilgrim Iron Foundry Co., near Seaside, Plymouth, Mass., is completed and active operations have begun.

Lang & Shaarman will build a foundry and machine shop at Marshfield, Minn. They will manufacture agricultural implements.

The Cogswell Polytechnic College, of San Francisco, Cal., is adding a foundry to the many lines in which it will give instruction.

The New Britain Brass Co., Hartford, Ct., has appointed P. J. Flannery general manager and Fred Frank superintendent of the concern.

Patrick Rooney, of Swanton, Vt., has his new foundry nearly ready to start operations. It will be run in connection with the Swanton machine shop.

It is a current report that the Armington & Sims Engine Co., of Providence, R. I., are making preparations to increase the capacity of their already extensive plant.

Worcester, Mass., claims to have 25 foundries, giving employment to over 1,500 men. The castings made are almost entirely used for machinery.

The King & Andrews Company of Chicago, manufacturers of semi-steel castings, is increasing its facilities for handling heavy work by installing a 25-ton crane.

The capacity of the Curtis Bay Brass and Metal Works, of Baltimore, is about to be doubled, a number of new buildings erected and an iron foundry built.

The Corsicana (Tex.) Iron Works have been purchased by Carlies & Wilson, of Waco, and the plant will be put in operation at once.

A foundry containing a 24-inch cupola and two brass furnaces is one of the latest additions to the Ohio State University at Columbus, O.

The Waukesha Malleable Iron Company, of Waukesha, Wis., has filed an amendment to its articles of incorporation increasing its capital stock to $100,000.

The Firth Sterling Steel Company, lately formed at McKeesport, Pa., with a capital stock of $800,000, will in the immediate future erect a 30-pot crucible furnace.

Mr. Nick Diedrich, of the foundry firm of McGirl & Diedrich, Bloomington, Ill., has disposed of his interest in the foundry to Mr. McGirl, who will continue the business.

The Ross-Mehan Foundry Co., of Chattanooga, Tenn., are building additional furnaces in their malleable department, which, when completed, will double their capacity.

The Gates Iron Works, Chicago, has completed plans for important additions, rendered necessary by the decision of the company to build Fischer-Gates high speed engines.

The property of the Smith-Carleton iron foundry in New Bedford, Mass., has been sold to William Pray and others of Boston, known as the Boston Steel and Iron Co.

The Hamilton (O.) Machine and Foundry Company has closed a contract for the erection of a brick building one story high and 119x40 feet in length, to be used as a foundry.

The work on the new building of the National foundry and pipe works, at Scottdale, Pa., is progressing rapidly. Employment will be given to 200 men when the plant is finished.

Gurney Stove and Range Co., of Rome, N. Y., has been organized with a capital of $20,000. The directors are Willey L. Kingley, Jonathan S. Haselton and J. Theodore Gurney, of Rome.

A meeting of the stockholders of the Rippel Foundry Co., of Mt. Gilead, O., was held Jan. 27 to consider a proposition looking to the erection of new buildings made necessary by largely increased business.

The Abram Cox Stove Co. has purchased the plant of the Leaf stove works, at Phillipsburg, N. J., and will move it to Lansdale, Pa., where they will operate it in connection with their extensive works.

Ground has been broken for a new brass foundry at Watervliet, N. Y. The firm, W. H. & S. B. Wallace, expects to have the new structure completed next month, and will give employment to about thirty men.

Warren W. French has bought W. W. Whitney's foundry at the junction of Waters and West streets, Millbury, Mass. Mr. Whitney will be retained as an employe to do the traveling and securing the contracts.

Cleveland, O., men have incorporated the American Foundry Co., with a capital of $40,000. The incorporators are Charles A. Irwin, Charles A. Hall, J. J. Carey, Crosby Thompson and John McGurk.

It is stated that ground will be broken on March 1 for the new foundry and pattern warehouse to be erected by the Laidlaw-Dunn-Gordon Co., Cincinnati, to cost $150,000; contracts for the work will be let in a short time.

The Johnson Parfitt Tool Company has been incorporated at Springfield, Ill., with a capital stock of $15,000, to manufacture tools, engines, machinery, etc., by Thomas B. McGregor, Annie C. Courtnay and Thomas F. Sheridan.

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Thomas Jameson, 2219 Chestnut street, Philadelphia, has finished plans and is receiving bids on a foundry for the Fairmount Steel Works. The building will be constructed of brick and iron, with a composition roof. It will be 76x96 feet, one story high.

H. C. Hovey & Co. have erected a new foundry, 175x70 feet, corner Provost and Eagle streets, Brooklyn, N. Y., for general jobbing and piano plates which they make a specialty of. It will be equipped with all the modern devices necessary for a first-class shop.

The citizens of El Reno, O. T., have organized a stock company to secure the location of Price Ferguson's foundry and machine shop, at present in operation at Osage City, Kas. The name of the new company will be the El Reno Foundry and Machine Company.

The Carnegie Steel Company has opened branch offices in London and Liverpool. It is stated that it is the intention of the company to compete with the British for contracts in all colonial countries, Japan, China, Russia and wherever else the British have a market.

F. H. Mills, William Briggs and Arthur M. Gaylord, of Auburn, N. Y., who represent the brass foundry which is situated in the prison and heretofore have employed the prisoners in contract labor at their foundry, are contemplating a removal of their plant to Weedsport, N. Y.

The Chagrin Falls (O.) Manufacturing Co. has made a lease for two years of the company's plant to the Ferro-Steel Company, which now has a large plant at Chagrin Falls engaged in manufacturing steel ranges. The newly acquired plant will be run full on sadirons and shelf hardware.

S. E. Parker, of Kansas City, Mo., representing a manufacturing company, has purchased of ex-Gov. E. N. Morrill the old Union foundry on Cherokee street, between Main and Second streets, Leavenworth, Kas. The consideration was $20,000. The place will be improved and operated in the near future.

Articles of incorporation have been filed by the Webster Foundry Sand Co., of Borton's Landing, N. J., with a capital stock of $150,000, of which $100,000 is paid in. The incorporators are Laura M. Webster, Wayland S. McKerman, James P. Holmes, Geo. A. Wilbur and Fred C. Dean.

The Rider-Ericsson Engine Co., of Walden, N. Y., has been incorporated to manufacture air pumping engines, pumping machinery, locomotives, boilers, engines, etc.; capital, $100,000. Directors—William Murray Sayer, Jr., Brooklyn; Richard S. Sayer, Englewood, N. J.; Leander A. Bevin, Northport, L. I., and George H. Robinson, New York.

Timothy Holland, of Bremen, Ind., is in Baltimore making arrangements for the establishment of a foundry for the manufacture of his patent hot-water radiators, employing 400 operatives. Among Baltimore men interested are Walter B. Brooks, of the Canton Land Co.; Percy McLaren, Arthur Ebberman and D. Eldridge Monroe.

The Baldwin Locomotive Works, Philadelphia, Pa., have let the contract for the erection of their new boiler and brass shop. The building will be of brick, iron and steel, with granite trimmings, of two and three stories. It will have a front of 180 feet on Fifteenth

street and extend 380 feet on Buttonwood street, and 200 feet on Hamilton street.

The Torrey Manufacturing Co., of Bath, Me., will erect an extensive establishment for manufacturing various kinds of brass work. Mr. Torrey has been investigating the properties of metals for the last few years, and is said to have discovered several improved alloys, one of which is said to be the most durable material so far found for trolley wheels.

Fire Fiend.

The H. B. Smith Co., of Westfield, Mass., had a portion of their foundry destroyed by fire in January. Loss estimated at $2.500.

The Dolan foundry and machine shops at Logansport, Ind., was burned Jan. 28. Loss $25,000, insurance $8,000.

A fire on January 29th destroyed the foundry and machine shop of S. B. Stine at Osceola Mills, Pa. The loss is about $15,000, with very little insurance.

E. Williams & Co., brass and bell founders, 177 and 179 High street, Boston, Mass., were visited by fire Jan. 29, resulting in a damage of about $2,000.

The Goodell & Waters Iron Works, on the corner of Fifteenth and Willow streets, Philadelphia, Pa., was damaged by fire on Jan. 15. The loss is partially covered by insurance.

William H. Minnick's foundry and machine shop at Warriorsmark, Pa., with all the contents burned to the ground on Tuesday morning, Jan. 12. He carried $18,000 insurance.

The foundry department of the Woolley Foundry and Machine Co.'s plant at Anderson, Ind., burned Jan. 27. President Woolley says that the loss is $5,000, with $1,000 insurance. It will be rebuilt at once.

An accident at the Lobdell Car Wheel Co.'s foundry, Wilmington, Del., last week destroyed the air furnace and shattered the windows of the building. Several shells which had been sold to the company as old iron exploded.

Fire visited Bernard Holz's brass foundry, 1119 and 1121 Sycamore street, Buffalo, N. Y., Jan. 22, and did considerable damage. It is estimated that the loss on building and machinery will amount to over $2,000; covered by insurance.

The Derwent foundry at Ellwood, Pa., was destroyed by fire Jan. 11. The loss is estimated at $60,000. When the walls of the enameling department fell they injured a number of persons. The buildings were partly covered by insurance.

The Manheim Foundry and Machine Works, of Manheim, Pa., operated by Franklin Diller, were almost entirely destroyed by fire on the night of January 30, together with considerable finished work. Loss, $4,000; insurance, $2,500.

The Northwestern Stove Repair Co.'s factory, 225 to 237 West Twelfth street, Chicago, was entirely destroyed by fire Jan. 24. The company is owned by Robert L. and Ralph S. Greenlee. They place the damage on contents at $300,000 and on the building at $125,000.

The plant of the Missouri Frog & Crossing Co., at Centropolis, Mo., was nearly consumed by a recent fire. The damage to the plant will exceed $25,000, while $15,000 insurance was carried. John I. Blair, of Blairstown, N. J., owner of the concern, states that he will rebuild at once.

The extensive plant of the Lebanon Boiler Foundry and Machine Co., on West Forge street, Lebanon, Pa., was gutted by fire on the morning of Jan. 28. The fire was started by an incendiary in the pattern making department, and made rapid headway before the fire department arrived. The loss is $5,000, and is covered by insurance.

CORRESPONDENCE.

Editor The Foundry:

The letter in the January number of THE FOUNDRY from Edward Taylor & Son, Tangier, Morrocco, brought to mind a true story related to me by a brother molder. It was something as follows. (My friend was a good hand at word picturing and delineation of characters, and could bring out the humor in a humorous way.)

He was engaged in Cincinnati, Ohio, to accompany an elderly farmer-looking gentleman to the F. G. home down in Tennessee. In an interior hamlet two brothers had es-

tablished a small machine shop—blacksmithing and wheelwright—and had a small building some 25x40 feet rigged up to make a few indispensable castings, as repairs to corn shellers, grist mills and agricultural machine breakdowns.

Neither of the brothers were molders, but had employed an old molder, who had been with them for years, and who died suddenly one day in the foundry.

So one of the brothers had journeyed to Cincinnati to procure another man who knew how to make castin's, as the old man expressed it.

In the interval while this old gent was in quest of a molder the remaining brother and the eldest boy's son, 2 or 3, 10 or 12 years old, had tried their hand at molding and taking off a heat or two.

At about noon my friend arrived, after a 25-mile ride on horseback into the interior, after leaving the steamboat. A cast was about to be attempted. After a good wholesome dinner all was hurry and scurry and feverish excitement, to melt some 700 or 800 pounds to pour off the shop. The cupola was charged up all right and a horse hooked on to drive the fan, when the circus commenced. The iron came down slowly, but good and hot, but every flask that was poured either run out at the joint or through the bottom boards. Some were poured without clamps or weights and copes lifted, but still through it all the two old gentlemen seemed to be perfectly tranquil and showed a serenity that was akin to angelic. When the pouring was over the younger boys were shaking out the molds and digging out the wounded and dead, and putting out the fires among the flasks. The older boys (the two brothers) were philosophically talking over the work that was wanted, what had been molded, etc., etc.

Finally one of the boys came up and says, "Pa, I don't bet there is a piece good."

Just then the other lad gave a cry of joy. "Yes, there is; here is a piece all right," and he held it up—a small grate.

The brother who had managed the foundry in his brother's absence remarked, "Wal, thet ere is doggoned better then the heat afore this."

"How is that?" says my friend.

"Wal, 'cause we never saved a doggoned piece afore."

L. C. JEWETT.

Boston, Mass.

Pittsburg Report.

Trade at present seems to be a counterpart of that reported for some weeks past. The most prominent feature is dullness and in all lines the aggregate amount of business doing is quite small. The eastern market is said to be particularly inactive. Some very low figures have been reached in the raw iron and steel market, and it is hard to say whether they will go lower or not. The only brand of iron that has shown any change during the past week or so is Bessemer, the price now ranging at $10.25 to $10.50. No. 1 foundry rules at $11.25 to $11.50, and No. 2 at $10.50 to $10.75. In and around Philadelphia, No. 1 foundry sells at $13, and No. 2 at $12, with variations from these figures for quantity and quality.

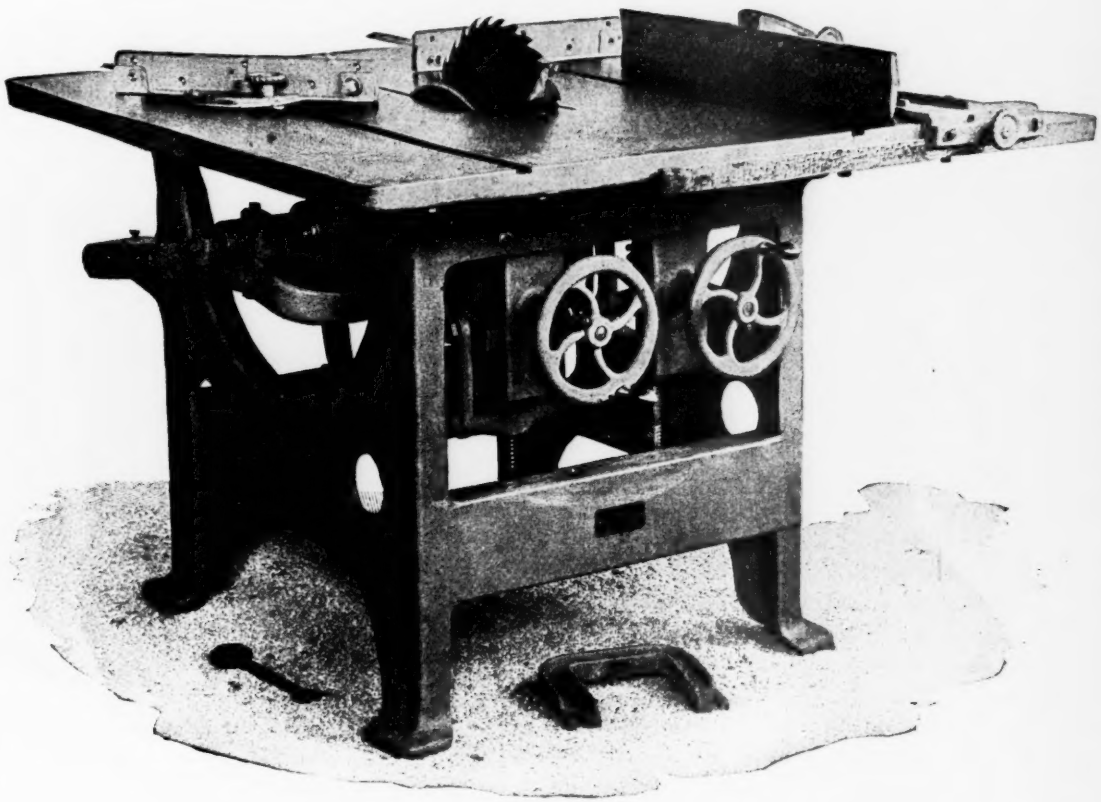
In the Mahoning Valley, the feeling is somewhat better than for some time, and holders of pig iron are inclined to be more firm. Stocks are fast increasing and the same feeling is shown that an improvement must come before a great while.

The foundries in this vicinity are only averaging a little over half-time. Some weeks the men are employed rather regularly, but other weeks they are laid off for want of orders. No large orders for rolling machinery have been placed lately and none are expected, as few manufacturers will begin improving their plants until spring at least. Several open hearth plants are contemplated, but plans have not yet been prepared and nothing much can be heard concerning same. The following shows the ruling prices for rolling mill castings:

	Cents per lb.
Chilled rolls, up to 12" diameter.....	3¾
" over " "	3¼
Sand and homogeneous steel rolls and pinions up to 12" diameter.....	2¾
Over 12" diameter.....	2¾
V-tooth pinions, additional.....	2¼
Housen and rolling mill casts not otherwise specified	2
Spindles and coupling boxes.....	1¾
Squeezer castings	2
" pinions and wheels.....	2½
Spur and bevel wheels, large.....	4
Spur and bevel wheels small.....3 to	2¼

Improved Double Saw Bench.

The engraving shows a new medium size saw bench arranged with two arbors for carrying a cut-off and a rip saw at the same time. It is all iron and steel, and the frame is cast in one piece, making it strong and massive. The arbors are 1¼ inches diameter. The arbor frames swing on a heavy steel trunnion shaft, and the end next the operator is guided in a vertical way, so that there can be no side motion to the saw at any part of its adjustment. The adjusting screws are very convenient, and the shifting of both arbors occupies only a small fraction of a minute. The table is all iron, and has no crosswise slots, the splitting gauge being arranged on a way outside of the table. This gauge is adjustable to a miter and is accurately stopped at both miter and square, and can be set at any intermediate angle. A large throat plate admits both saws, and an iron plate fills the opening, and can be lifted out instantly to get access to the saws. One arbor extends beyond the nut to accommodate cutter-heads of various kinds. Cut-off gauges are provided, one of which is adjustable to a miter, and they may be used on either side of the saw. Every part of the machine is conscientiously fitted, and table, gauges and arbors are carefully aligned and adjusted so as to do accurate work. A screw adjustment for end play is provided on the arbors and the journals are nicely fitted to scraped bearings so that they will not heat with fair treatment. The counter-shaft has tight and improved self-oiling loose pulleys. One each, cross-cut and rip saws are furnished, 16 inches diameter.



DOUBLE RIP SAW.

The Frank H. Clement Co., of Rochester, N. Y., are the manufacturers.

Lecturing to Molders.

Another of the series of lectures (previously mentioned in these columns), to which the molders of Worcester, Mass., have had the pleasure of listening, was delivered by Col. W. S. B. Hopkins, city solicitor, in Stationery Engineers' Hall, Worcester, Mass., on January 11. The speaker gave a highly interesting address on "Law for Labor Unions." The hall was comfortably filled, and Col. Hopkins for an hour held the strictest attention of his auditors. Col. Hopkins said the great trouble with men is that they will not meet for the intelligent and calm discussion of the conflicting views they may have.

If men will not meet and exchange views, there are three methods which can be adopted to change their minds. One is the method practiced by Cain when he struck Abel with a club; another is that adopted by two countries when they hold differences of opinions, and go to war; the third is that which is resorted to by men who are willing to give each other fair play and submit the subject in dispute to arbitration.

All men desire fair play for themselves, and if a man can be found who does not wish his opponent to be accorded fair play, and attempts to prevent him from securing a position which he has left because he could not agree with his employers, he does an injustice to the community. There is no law which compels a man or corporation to hire men whom they do not desire to have about their premises. Consequently, if a man leaves a situation because he and his employer cannot agree, either on a matter of wages or upon the time of service required, he does an injustice to his fellow-man and to the community at large if he attempts to prevent another man taking his situation.

The speaker said there were but two laws on the statute books of Massachusetts which relate to the workingmen. One of these is that no man shall intimidate another, and the other is that if the employer contracts with the employe that two weeks' notice shall be required in case the employe intends to leave his position, the employer is obliged to give the employe two weeks' notice if he wishes to dispense with his services.

Col. Hopkins said that there was a very good way of settling disputes between the workingmen and their employers in the state of Massachusetts. Here there is a state board of arbitration composed of three men, one of whom is a recognized leader among the workingmen but who does not employ labor, another selected by employers, and the third chosen by these two.

This board can be applied to by either employers or employed, either previous to or after trouble, but its decision in the matter is not final and does not settle the trouble, but only brings the matter before the public and forms in a large part public opinion on the subject, which, in a large way, will settle the matter.

All through his talk the speaker cautioned the men not to resort to strikes to settle any differences which may arise between them and their employers, but to submit the question for arbitration. His advice was to hold off a strike until there is no other alternative.

At the close of his remarks, a vote of thanks was extended to the speaker for his able address.

Another meeting of the union will be held two weeks from last night, when another speaker will deliver an address.

Chicago and Vicinity.

Business is still quiet in Chicago. Very few foundries show an improvement. Collections are hard to make and the price of castings is very low.

Cork & Son's Plumbing and Heating Co. will start a foundry at Seventy-third and Storm avenue.

Kistner & Mynerick will open a foundry at 605 West Twenty-second street.

Wickham & Chapman Co., of Springfield, O., have bought the Garden City Foundry Co.'s plant, which was sold at sheriff's sale. G. D. Turner will manage the plant.

A portion of Greenlee Bros.' plant was destroyed by fire. Loss, $300,000. The foundry and patterns were not damaged.

Brown Bros. will move from their present quarters as soon as they can find a suitable location.

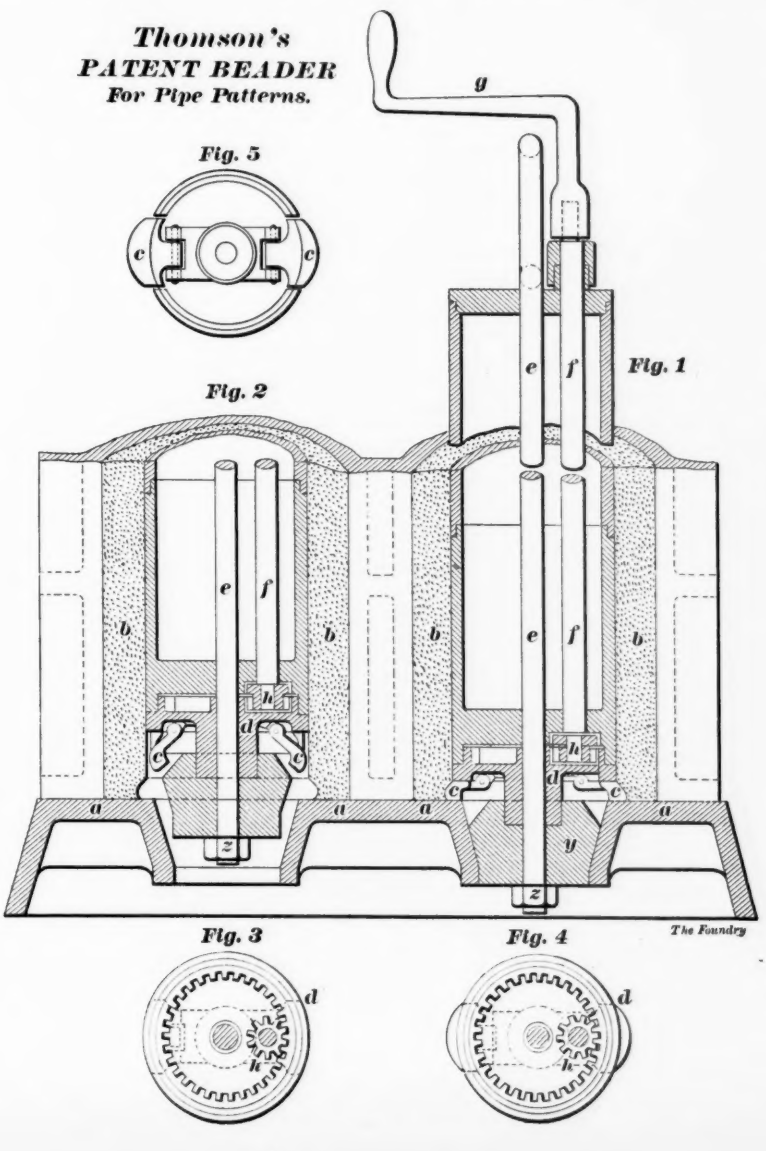
The Sargent Co. are busy.

The Thomson Patent Beader for Pipe Patterns.

The object of this invention is to make the pattern for the bead an integral part of the pattern for the pipe and to secure a bead that must necessarily be exactly concentric with the pipe. We attain that object by the mechanism illustrated in the accompanying drawings in which Figs. 1 and 2 are longitudinal sections of a pipe pattern with the apparatus in question attached to the foot or lower end thereof. Fig. 1 represents the pipe pattern in position on the pouring-seat with the sand rammed about it, and Fig. 2 represents the pattern in the act of being withdrawn from the mold. A. A. represents the pouring-seat and B. B. the sand rammed around the pattern.

Figs. 3 and 4 represent cross sectional views of a pipe pattern with the device in question attached. Fig. 5 is a plan view of the device in question viewed from below.

The essential feature of the invention consists of one or more metal "slicks" or "slickers" c. c. hinged to a gear d., which gearing revolves around an axis formed by



the rod e. running through the center of the pattern, the revolution of the gearing being produced by a rod and crank f. and g. ending in a pinion h.

When the pattern rests on the pouring-seat, the slicks from the upward pressure of the pouring-seat take the position indicated at Fig. 1 and the outer ends of the slicks, which project beyond the line of the pattern, correspond in outline to the outline of the bead to be formed on the end of the pipe. When the pattern is in this position the sand is rammed in the ordinary way.

The gearing to which the slicks are attached is then made to revolve by turning the crank controlling the rod f. and thus the mold or matrix for the bead is formed in the sand. When the pattern is withdrawn from the mold in the ordinary way, and as it is raised from the pouring-seat, the outer ends of the slicks fall downward and inward by their own weight, as shown at Fig. 2, and thus make no interference with the mold for the pipe.

Fig. 3 shows the pinion at the end of the rod f. controlling the movement of the gearing d. to the under side of which the slicks are hinged. In Fig. 3 the slicks are supposed to be in the position indicated at Fig. 2. Fig. 4 is similar view of Fig. 3, except that the pattern is supposed to be resting on the pouring-seat and the slicks c. c. are in position to form the mold for the bead as represented at Fig. 1. Fig. 5 is a view of the under side of the gearing d., showing the form of the slicks adopted and the method in which they are hinged to the gearing.

The above mentioned drawing and description will be thoroughly understood by pipe founders. Mr. Thomson, the inventor, has had the "beader" in use in the Gartshore-Thomson Pipe & Foundry Co. (Ltd.), Hamilton, Ont., for the last two years, where it can be seen in operation.

Pig Iron Statistics.

The production of pig iron in 1896 was 823,181 tons less than in the previous year, or a falling off of about 8 per cent. The detailed statistics show that the total production of pig iron in 1896 was 8,623,127 tons, against 9,446,308 tons in 1895, 6,557,388 tons in 1894, 7,124,502 tons in 1893, 9,157,000 tons in 1892, 8,279,870 tons in 1891 and 9,202,703 tons in 1890. It appears from these figures that the output last year made a fair average for the entire period between 1890 and 1896, inclusive, while the prices were below the average for the same time. The lowest producing period was in 1893, or the year of greatest financial depression, while 1895 occupies the first place in output yet did not improve in price. Notwithstanding this, the principle that the production of pig iron, without any excessive accumulation, constitutes a good business barometer, assures the belief that we are better off than had been expected and that a recent progress has been made through an increase in output in December and January.

Questions and Answers.

H. M. McE. asks for a cheap formula for making steel castings, such as shear knives and small gear work. Perhaps some of our readers engaged in steel founding will give the desired information.

W. S. M. inquires about the utility and general details of construction for conveyors intended to handle molding sand, such as is commonly found in connection with molding machines or in other places where a constant supply of sand is desirable.

J. G. R., referring to his letter in the December FOUNDRY, says:

I am more than pleased to see that some one has enough interest in the subject of cupola practice to inquire regarding the same. As I stated before, I think the subject is worthy of some thought. I think the questions asked by J. P. are to the point and, as the gentleman states, need to be taken in consideration. I will try to answer them in as few words as possible. We use limestone for a flux and about 55 pounds per ton charged. Our slag hole is 36" from bottom doors and 2½" in diameter. We have three rows of tuyeres 5" apart; the first row is 39" above the doors and 5x9"; the others are 3x6" oval; all are inclined down. The rows are 5" apart. There are wickets in the wind box in front of each tuyere, which enables us to get at them and punch them out when clogged up. We get our blast from a No. 7 Root blower, running about 120 revolutions per minute,

with average pressure of 10½ oz.; sometimes it will run as high as 12½ or 13 oz. Distance between cupola and blower is 60 feet, connected by 24" sheet iron pipe.

J. P. asks about wetting down. It is, as he stated, to retard combustion and to save fuel, but I always wet my coke before charging, and often, as his friend did, turn the hose on when charging. I may be a crank on that subject, but I firmly believe in its efficiency.

Our coke is good average foundry coke, hard and firm, and with as little sulphur as possible. As to 72-hour coke, we get it more in theory than practice in this age.

As to how the cupola looks after running several heats you would be very much surprised to see how little it affects the lining, and it always drops well.

As to the bridging J. P. spoke of in his cupola, does it not come from some local cause, such as letting it get very low below the charging door, or, in other words, improper charging. I have that trouble in my smaller cupola, but can always trace it to the cause above mentioned, or from letting the metal run over into the tuyeres and not keeping the slag hole open.

Hoping I have made these questions, or answers to them, clear, I will close with a question: What do you do with your shop iron and cleanings from the bottom?

J. A. writes: Will you, in the columns of THE FOUNDRY, tell me if there is any composition that will make ordinary cores cheaper than flour and sand?

(There are several preparations on the market superior to flour. You may obtain more information on this subject than we can give you here by addressing the American Glutrose Works, Philadelphia, and Vreeland Tompkins, Jersey City, N. J. See advertisements of these firms in another column.—Ed.)

W. G. C. asks: Can you give us the receipt for an alloy which will make a "copper" casting? We do not believe copper can be run pure, but have seen castings which are as red as copper and must contain a small percentage of alloy. When we use almost pure copper the castings are spongy (porous). When we use more alloy we obtain a sound casting but lose the red color.

(In casting pure copper the blow holes and swelling are caused by the occluded gases given up by the oxide, which is always present in melted copper. Now, if this oxide can be reduced to metallic copper and the oxygen removed as a solid slag and not as a gas, the copper will cast as solid as brass or iron.

The only thing we know of which will effect this is silicon. The oxygen in the melted copper having a greater affinity for silicon than for copper leaves the latter and forms silica and silicate of copper, which floats as a slag and is skimmed off.

An alloy of copper and silicon containing 90 per cent of copper and 10 per cent of silicon is manufactured by the Cowles Electric Smelting & Aluminum Co., of Lockport, N. Y., and is sold largely for the above purpose. From 1½ to 2 pounds of the silicon-copper alloy added to 100 pounds of copper will make the copper cast perfectly solid and free from blow holes. If just the right amount of silicon is used none of it remains in the casting, so that the result is a casting of pure copper. Anyone who knows something of the difficulty of getting pure copper castings sound and free from blow holes will find the silicon invaluable for that purpose, and after once trying it will never attempt to make a copper casting without it.—Ed.)

Obituary.

A. N. Bain, for thirty years connected with the Bain Manufacturing Co., now known as the Charleston Foundry Co., Charleston, Ill., died Jan. 22, aged 69 years. At the time of his death Mr. Bain was president of, and heaviest stockholder in the Charleston State Bank and had been since its organization in May, 1892. Mr. Bain has always been a leading figure in Charleston's advancement.

Reuben R. Royer, proprietor of the Ephrata foundry, Ephrata, Pa., died suddenly in that town from apoplexy, aged 69 years.

John E. Daly, of the foundry firm of John E. Daly & Co., Brooklyn, N. Y., died in the Brooklyn hospital on Jan. 11, after an operation for appendicitis. Mr. Daly, who was 40 years of age, had been engaged with his

brother Richard, in the foundry business for a number of years.

In the death of Mr. James Wyatt Shields, who died on Jan. 9, the city of Richmond, Va., loses another of its highly esteemed and time-honored citizens. In his early youth Mr. Shields came to Richmond and received his school education at what was known as old Parson Hart's academy. Subsequently he became engaged in the iron manufacturing business with the firm of Simpson & Peay, and during the war between the states superintended the manufacturing of ammunition for the confederate government in this city. He superintended the making of the cannon balls used at Fort Sumter, and during the latter years of his life took a great deal of pride in this fact. All during the war he kept his works under way turning out ammunition for the use of the soldiers. The larger missiles of death were principally made and the concern made a great many shells. At first some difficulty was experienced to keep them from exploding immediately. Mr. Shields' inventive genius overcame this difficulty and an explanation of the device he always delighted to give. He would often entertain his friends by relating the difficulties and triumphs of his works during the war.

Joseph Rollins, formerly connected with the Star Foundry and Machine Shop at Winnebago, Minn., died Jan. 20, at that place.

William Barr, senior proprietor of Barr Bros.' Foundry, Woonsocket, R. I., expired on the first inst., aged 40.

George Works, for many years a business man of South Elgin, Ill., died February 3d. He was one of the first foundrymen in this vicinity.

James Howell, ex-mayor of Brooklyn and president of the board of trustees of the Brooklyn bridge, died on January 27 after a long illness at his home in Brooklyn, N. Y., at the age of 68 years. Mr. Howell was born in Bradford, England, and came to this country with his parents when he was six years of age, settling on a farm in Ohio. In 1845 his parents removed to Brooklyn, where he shortly entered into an apprenticeship of four years in an iron foundry. At the close of his apprenticeship Mr. Howell was promoted to be foreman in charge of the shop, and in 1855 he started in business for himself. In the course of time he took a partner, and the firm became Howell & Saxton, employing several hundred men in their iron foundry. The company's foundry has been closed for several years, Mr. Howell having latterly devoted his attention to municipal affairs and to public business generally. He served two terms as mayor of Brooklyn, and in 1893 he was appointed a bridge trustee, which office he held at the time of his death.

Chilled Wheels in Austria and Russia.

In our manufactures we use charcoal iron exclusively and consume from 10,000 to 15,000 tons annually, of which Lake Superior iron forms a considerable part. From time to time we have exported small quantities of Lake Superior iron for trial and comparison with European charcoal irons for reasons hereinafter stated. It is, however, a very open question whether or not this can be done successfully. At any rate, the conclusion that large quantities of this iron have been and are to be exported is not in accordance with the present facts.

In connection with this it may be well to correct the statements that are being published from time to time about the introduction of the American chilled wheel into Austria Hungary long before they were in use in America; and, while it is difficult to trace the exact period of their introduction into this country, it is nevertheless an undeniable fact that the knowledge of their manufacture was received from Hungary, a country which has long been famous for its manufactures of chilled iron, says P. H. Griffin in a letter to the Iron Age. In recent years a good demonstration of the fact that this art has not been lost may be found in the development of the Hungarian roller process for making flour, an invention which has revolutionized one of the greatest industries by the substitution of rollers of chilled iron for the grinding stones formerly used.

Chilled wheels of excellent quality have always been used in Austria-Hungary in large numbers. It is true that the General Union of European Railways does not favor the use of cast wheels—whether of steel or iron—but this does not apply alike to all countries. That cast wheels are not regarded

with favor in some countries is due to the fact that the quality of such wheels delivered for service has not in all cases been satisfactory, and their use was very properly prohibited. There is not the slightest doubt that when a satisfactory quality of chilled wheels can be furnished, the objection to their use will be generally withdrawn. Greater progress has been made in Austria-Hungary and America than elsewhere in the manufacture of chilled iron, because in both countries iron of a suitable quality is found.

The great development of railway construction in Russia and the East bring to the front the question of railway wheels in a most important way, for the number required will be very great. The conditions of this construction closely follow the early days of American railway building, when the manufacturers of the material required were taxed far beyond their capacity of supplying rolling stock, equipment, etc. This condition is being repeated in Russia to-day, where the development of railways is going on at a rate little appreciated by those not familiar with the facts. The recent journey of Prince Hilkoff, Minister of State Railways of Russia, shows the wonderful advances that have been made in the past few years in Russia. His journey was remarkable because it was the first trip around the world made over Russian railways, through Siberia, across the Pacific, etc., Although the Trans-Siberian railway is not yet completed, it was possible for Prince Hilkoff to make this trip comfortably by crossing in suitable vehicles the part of Siberia not yet traversed by the railway. The visit of Prince Hilkoff to the United States was maifinly for the purpose of observing the advances in railway practice and construction since his visit to this country many years ago.

It is naturally the desire of the Russian Government to develop in their own country, as largely as possible, the manufactories for the supply of all the materials required in this great work; and in the past few years many factories have been established for the purpose. Capital and skilled labor from the different European countries have been interested in this enterprise, and Americans have not been idle in the work, an American company having joined with some great Russian companies in establishing plants for the manufacture of cars, locomotives, pipe, etc.

The chilled wheel is particularly suitable to the conditions that must be met. Its cost is lower than that of the forged wrought or steel wheels. It requires practically no attention in service, as it resists wear in a remarkable degree; and the scrap value when it is worn out returns nearly one-half the original cost. It can be resmelted into new wheels by the addition of certain proportions of new iron. As scrap it is useful, with no waste, and with little expense of preparation, for all manufactures of iron and steel. The question of chilled wheels being suitable for the purpose is practically settled by the fact that there are about 10,000,000 in use in America running under conditions very similar to those to be met in Russia. But the new wheels must be made in Russia, and there is the difficulty. Suitable iron is not yet obtainable in the necessary quantities, although Russia has unbounded resources in raw materials, wood for charcoal making, etc. These will be developed in time, but meanwhile we are trying to find what can be done in the matter of obtaining suitable iron for temporary use for such a purpose. To deal with the subject intelligently we have enlisted the co-operation of the best manufacturers of chilled wheels in Austria-Hungary. With them we are trying to work out the most suitable order of practice for the purpose and to obtain a proper knowledge of the most economical and suitable materials.

The statement that we are establishing works in Austria-Hungary is not correct. The works referred to have been in operation as manufacturers of chilled wheels for many years, and we are simply associated with them in working out the possibilities arising out of the new situation, in the interests of their business and ours. That the use of the chilled wheels is likely to extend in all European countries seems very probable, not in connection with steam railways alone, but in connection with electric railways. The conditions surrounding the manufacture and use of electric wheels differ radically from those associated with the use of wheels for steam railways, as electric wheels weigh 50 per cent less than steam railway wheels of like diameters, and there seems to be no probability of heavier sec-

tions being practicable. The narrow face and shallow groove rails allowed in street traffic prevent any increase of tread or flange section; and it would be useless to increase one part of the wheel without making a heavy section throughout. In addition to this nearly all electric wheels are traction or driving wheels and sustain far more severe wear than the ordinary carrying wheel used in steam service. The chilled wheel resists the increased wear most successfully, and by the use of the best material it is possible to make it of a quality suitable for the purpose. The developments in this direction are most satisfactory thus far, and promise to continue in like degree.

How Long Will the Steel Frames of Tall Buildings Last?

What is occurring or what will occur to the metallic portions of the many tall buildings that are in process of erection at the present time, under great dissimilarity as regards temperature, humidity and other climatic conditions, but of one characteristic sameness, viz., being sealed in solid masonry or other coverings beyond the ken of inspection? Probably no engineering question of to-day is entitled to more serious consideration than this one. In discussing it recently before the American Society of Mechanical Engineers, Mr. M. P. Wood maintained that while inspection of some of the buildings now in progress, as well as some of those lately erected, reveals possibly a slight improvement in the means of preservation adopted over those apparent a short time ago, yet the improvement is a hollow mockery, and will bear fruit for repentance before many years have passed. These structures, though more carefully painted than those erected before, with more and heavier coatings of some kind of stuff called paint, do not appear in a single case to have received any attention or consideration as to the condition of the metallic surfaces before applying the protective coating beyond a possible sweep with a dirty broom to get rid of the rough dirt from the workshop yard, and a possible wipe with a piece of old sacking to remove the grease due to machining processes. There has been nothing like a washing down of the parts with soda ash or lye water to remove the grease, and then pickling with weak acid to remove the mill scale, and a subsequent washing with lime water to neutralize the acid bath, warming the work before painting it, and taking care to apply the paint only on clear, bright days, when no sweating can occur, or applying the paint in warm paint rooms. It is safe to say that not in a single case out of the many skeleton structures of modern sky-scrapers can this be found to have been the procedure. There would seem to be no better possible assurance than all this of trouble ahead for coming generations. —From Cassier's Magazine for February.

Iron and Steel in Place of Silver.

Small metal articles, usually worn by ladies or gentlemen, which of late were principally made of silver, are now being manufactured of iron or steel. This fad has become very popular in France and Germany, and quite an industry in these articles has grown up in the manufacturing centers of these countries. Match safes, key rings and chains, knife blades, scissors, button-hook handles, cigarette cases, powder boxes, and any number of articles of this description are now made of iron. They are first stamped or wrought out of the sheet metal, then very carefully polished and cleansed with benzine, after which they are subjected to a treatment which gives the article a permanent black color. This black coloring is applied by a concentrated solution of nitrate of copper in alcohol, while the articles are being slightly heated. By mixing nitrate of copper with nitrate of maganese, various tints between blue black and a brownish black may be obtained. This process is used in the great industrial establishments of Pforzheim and Adar with much success. Particular care must be taken that the object to be tinted black is finely polished and absolutely clean; otherwise flaws will occur in the coloring. After being allowed to dry for a few hours, the black iron articles are covered with a very thin film of varnish or simply rubbed off with a waxed brush.

The new foundry of the Haymaker-Barry Company, at Connellsville, Pa., is being built as rapidly as possible. It will be thoroughly equipped throughout with the most modern improvements.

NOTICE!

Advertisements in this column, 30 cents a line for each insertion. About seven words make a line. The Cash and Copy should be sent to reach us not later than the 5th of the month to insure publication.

Answers addressed to our care will be forwarded.

TO SUBSCRIBERS

whose names appear on our **subscription** list, we will give one free insertion under this heading to those in want of positions, the advertisement to occupy a space of not more than five lines. Additional space or insertions must be paid for in advance at regular rates.

WANTED—Position as foreman in steel foundry. References given. Address Box 31, THE FOUNDRY.

FOR SALE—No. 3 Root blower, used only a few months; to be replaced with largest size. Address Box 4, care THE FOUNDRY PUBLISHING CO.

WANTED—By a foundryman, who thoroughly understands brass and iron founding and can furnish the best of references a position as foreman. Address box 46, THE FOUNDRY.

FOR SALE—A valuable foundry and machine shop fully equipped with good run of business. Reason for selling is death of proprietor. Address Thos. J. Peed, Executor, Knoxville, Tenn.

WANTED—Position as foundry foreman, 20 years' experience on light and heavy castings; have a method of getting out work at the lowest cost; best of references; distance no objection; salary moderate. Address box 11, care THE FOUNDRY.

WANTED—As superintendent of small cast steel foundry, a thoroughly well posted man, one who understands all about cast steel and is a practical molder preferred. Good wages to the right man. Address box 54, care THE FOUNDRY.

WANTED—A position as foreman by a foundryman who has large experience in car work, agriculture, light and heavy bench work and machine molding; thoroughly understands mixing of iron to get best results. Address box 55, care THE FOUNDRY.

WANTED—Foundry to work by contract, either by tonnage or other terms that may prove agreeable. Shop will be preferred where owners can finish work to a certain extent. Have had experience in operating foundries on contract. Can furnish the best of references. Address Box 49, care THE FOUNDRY.

WANTED—By a competent and up to date foundryman, position as superintendent where ability to handle men to advantage with an accurate cost system and to overcome difficulties would be appreciated. Well up in mixtures; 25 years in actual shop practice; a hustler; salary moderate and good references. Address box 52, THE FOUNDRY.

WANTED—Situation as foundry foreman. Has had 15 years' experience as foreman, and am possessed of a thorough knowledge of loam, dry and green sand, chilled and sand rolls, etc. Reference from my present employer as to sobriety and ability. Understands economical melting and mixing of iron. Can handle men to the best advantage. Address Box 50, THE FOUNDRY.

WANTED—Situation as foundry foreman by one who has had ten years' experience as foreman on all classes of work. Thoroughly capable of handling a foundry in all its details. Can manage men to the best advantage and understands the melting and mixing of iron to obtain different qualities. Can give the best of references as to character and ability. Address Box 53, THE FOUNDRY.

The lasting qualities of ordinary paint is promiscuous by its absence. The Joseph Dixon Crucible Co., of Jersey City, N. J., have made a few calculations to prove the merits of their Silica Graphite Paint and you can have a copy of the example with answer by addressing them. It will be a revelation to you if you intend to defy the action of the elements.

The Cincinnati Milling Machine Co., who for many years have made the manufacture of milling machines a specialty, have issued a neat pamphlet, setting forth the many novel features of design, which contribute to convenience in manipulation and insure the greatest productive capacity.

Robt. P. Cunningham, who has for the past eight years had charge of the foundry of the Atherton Machine Co. at Lowell, Mass., has accepted a position as foreman at the foundry of Henry R. Worthington, Elizabeth, N. J., and will at once assume the duties of his new position. Mr. Cunningham has always been classed as a most progressive foundry manager, and his many New England friends wish him success in his new venture.

The Pedrick & Ayer Co. have forwarded us their catalogue. With the increasing use of compressed air as a motive power in foundries we are chiefly interested in their line of automatic Belt Air Compressors, which occupy very little space and have the maximum of efficience.

The straight lifting and horizontal pneumatic hoists which this firm manufacture have gained a wide reputation for doing all that is claimed for them. With the advent of greater economies in the foundry, managers can not afford to overlook the installation of the most approved methods of handling material.

The suit of the American Pneumatic Tool Co. against the Chicago Pneumatic Tool Co., alleging that the Boyer hammer, which the latter firm manufactures, was an infringement on the patents of the American Pneumatic Tool Co., has been decided in favor of the Chicago Pneumatic Tool Co. by the United States Circuit Court of Appeals at New York.

The Whiting Foundry Equipment Co., of Chicago (works at Harvey, Ill.) report shipments of their new type two-speed chain hoist traveling cranes as follows: Woolley Foundry & Machine Works, Anderson, Ind., one 5-ton 20 ft. span. Dallas Elec. Co., Dallas, Tex., Western Elec. Co., Chicago, one 5-ton 32 ft. span. Also a 15-ton 43 ft. span crane to the Pioneer Elec. Power Co., of Ogden, Utah.

The Rankin & Fritsch Foundry and Machine Co., of St. Louis, Mo., the largest shops of the kind west of the Mississippi River, owing to the employment of all of the largest stockholders in other enterprises and their desire to retire from the machinery business, offer the splendidly equipped and magnificently located shops for sale at an enormous sacrifice, on easy terms.

They will be pleased to show the shops and books of the company to anyone contemplating purchase.

A new process for the protection of iron structures against the injurious action of rust has been suggested by a German chemist, M. Deninger, of Dresden. It consists of treating the iron with a solution of ferrocyanide, which forms a coating of cyanide of iron, uniform and impermeable to water, and of such a nature as to protect effectively the iron covered. The operation, applied on a large scale, is reported to have already given good results. The following is the method adopted in practice: The solution is mixed with a flaxseed varnish to which has been added a little turpentine or benzol, so as to cause a very homogeneous emulsion which can be applied without difficulty. The evaporation of the alcohol leaves the flaxseed varnish, which forms a coat protecting the cyanide of iron which is deposited upon the iron. There is no necessity of previously preparing the iron in any way beyond removing the beds of rust which are too thick to admit of the action of the ferro-cyanide.

Iron Molders' Union, No. 27, of Cleveland, is urging upon local members of the legislature the passage of a bill compelling the management of the Ohio penitentiary to put the letters "O. P." prominently on all stoves manufactured in the institution. The union alleges that the Cleveland Co-operative Stove Co. has been buying these stoves and putting the union mark on them. The company says that it has never marked stoves bought from the penitentiary with the union mark, but it buys convict-made stoves, which are of inferior quality, so as to keep them off the market in summer time, the stove selling season.

I would not be without THE FOUNDRY for double the price. Only wish it came twice a month.

J. T. DODWELL.
Supt. St. Louis Radiator Mfg. Co.,
St. Louis, Mo.

THE BEST IS THE CHEAPEST

WHEN YOUR FOUNDRY INTERESTS
ARE TO BE CONSIDERED

WE MANUFACTURE

THE BEST

East India Plumbago
India Silver Lead
Founders Perfect Wash
Foundry Facings
Foundry Supplies.

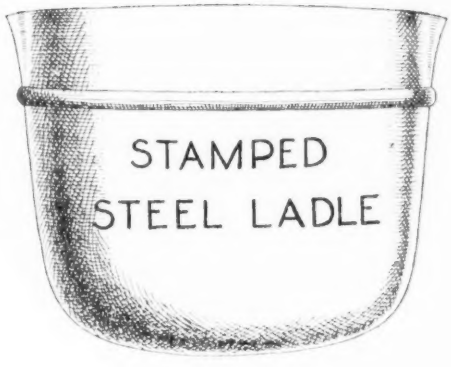
TRIAL SAMPLES FREE.
ALL GOODS GUARANTEED.

THE S. OBERMAYER CO.

CINCINNATI, O.

CHICAGO, ILL. LARIMER, PA. WHITE HAVEN, PA.

Something New



Our Stamped Steel Hand Ladle is being rapidly adopted everywhere among **Malleable, Stove Plate and Bench Foundries** as being one of the greatest labor savers ever presented to the foundry trade.

It is much lighter, (weighs just One-Fourth as much as the old style cast iron Ladle.)

Will Hold More Iron!
Will Not Crack!
Will Last Much Longer!

And is so much Lighter that much of the drudgery of conveying iron is overcome. Send for sample.

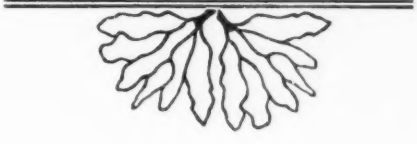
J. W. PAXSON & COMPANY,

Pier 45. **PHILADELPHIA, PA.**

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Casting.

537=39 West 27th St., NEW YORK.

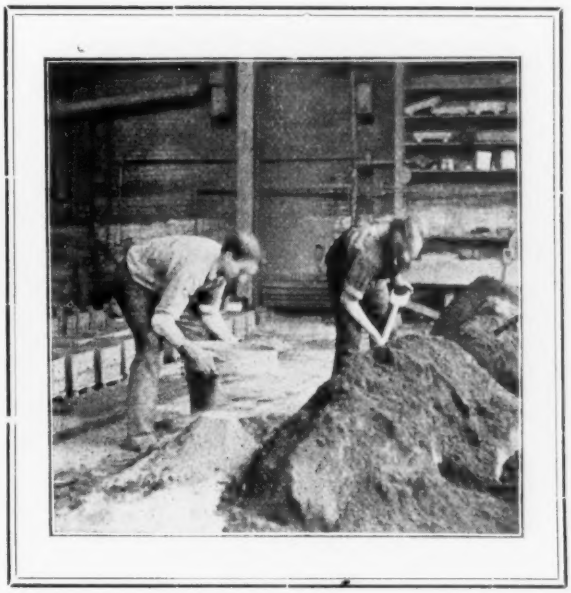
Providence Office,
42 S. Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I.
WATERFORD, N. Y.
ALBANY, N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

TRY OUR CRUCIBLES
THEY GIVE SATISFACTION
McCULLOUGH DALZELL COMPANY.
36 ST. & A.V. RY. PITTSBURG PA.



SAND!

TO SAY THAT A MAN

"HAS NO SAND"

is to refer to him in a decidedly uncomplimentary manner. Nearly as bad to say that his sand is no good. When referring to us, however, our friends—that is to say, our customers—always grow enthusiastic. . . .

THE REASON WHY

We mine and ship more sand than any concern in the Eastern or Central States is simply because, when we get a customer once, he is ours for good. We see that he gets exactly what he wants and that it's free from every kind of impurity.

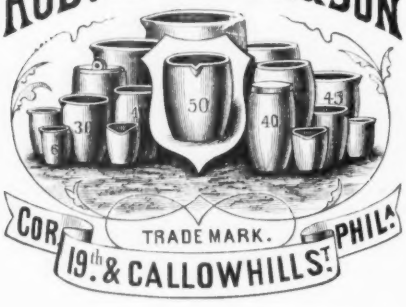
SAMPLES AND PRICES GIVEN ON APPLICATION.

Twelve Years' Experience In Mining and Shipping SAND and CLAY, enables us to ship you just what you need. We can send you any grade of MOLDING SAND you may require, from the finest to the coarsest, and guarantee quality always the same. Our No. 1 Sand has no superior that we know of for Stove Plate, Hollow Ware, Grey Iron and Malleable Castings; our No. 4 is the best Sand in use for Heavy Castings of any kind. It is an extra good wearer and is always sure to turn out a perfect casting. Our Crude Plastic Fire Clay is very refractory and guaranteed to work plastic readily in water.

E. M. AYERS ✻ MARKET BLOCK, ZANESVILLE, O

Crucible.

ROBT. J. TAYLOR & SON



Crucible

Dipper.

Cover.

Stopper.

Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; Small Crucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

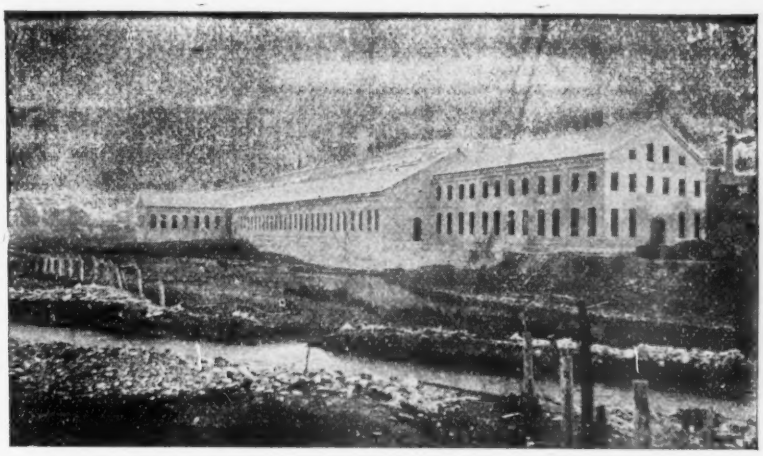
We make All Sizes, from 8 oz. to 2 ton Capacity.

ROBT. J. TAYLOR & SON,

1900 to 1916 CALLOW HILL STREET, PHILADELPHIA, PA.

Wrought Iron Bridge Co.,

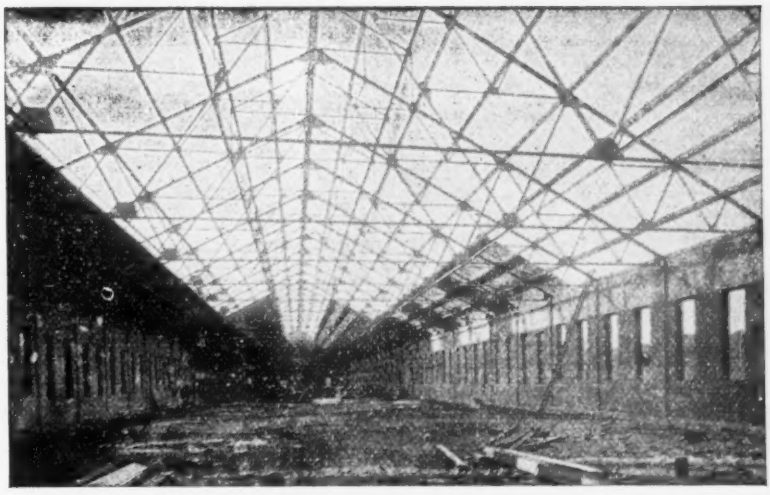
DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS



FOUNDRIES, MACHINE SHOPS
—FOR—
ETC., ETC.

Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



Buildings Designed for Special
Requirements.

Interior Foundry Building of Warder, Bushnell & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof. Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

Wrought Iron Bridge Co.

ADDRESS NEAREST OFFICE.

CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

136 Liberty St., NEW YORK.

CHAS. M. JARVIS, President and Chief Engineer.
GEO. H. SAGE, Secretary

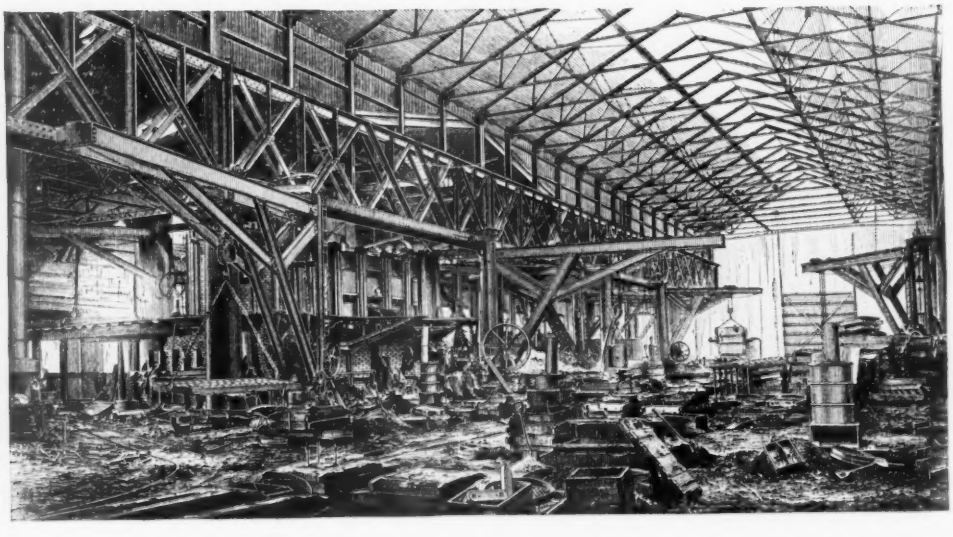
BURR K. FIELD, Vice-President.
F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph and shows the interior for a foundry, the frame work of which was designed and built by us for The Brooks Locomotive Company, at Dunkirk, N. Y. The building is 100 feet in width and 225 feet in length, the central portion being controlled by a travelling crane.

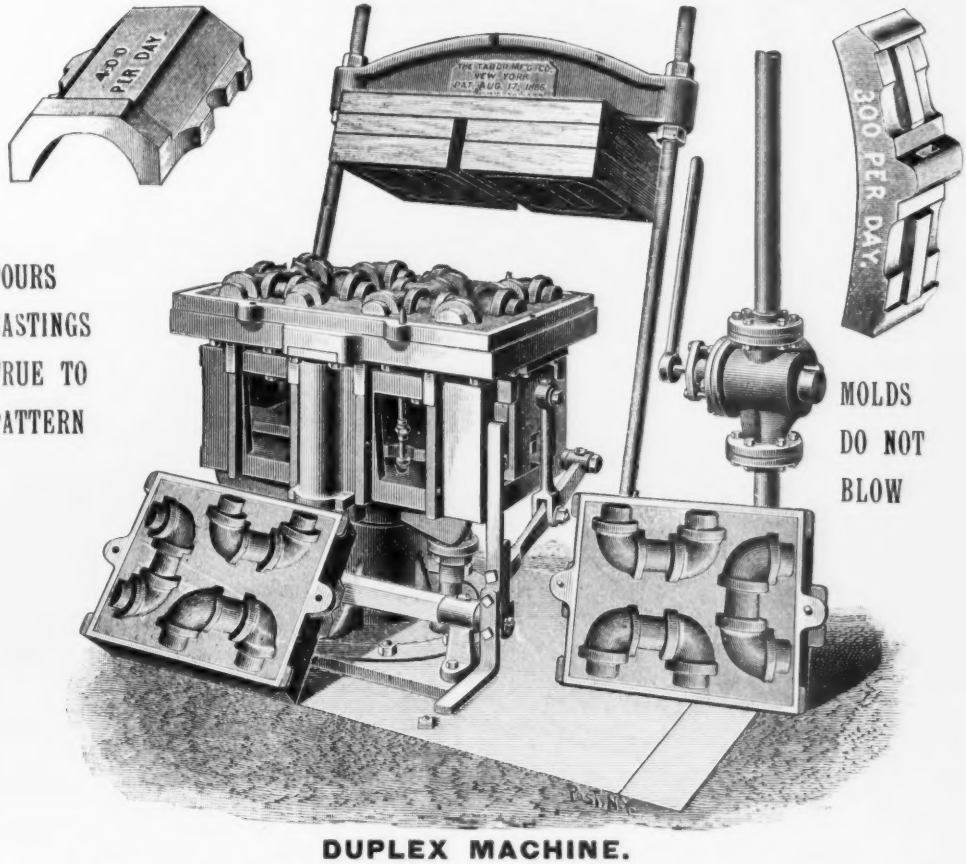
Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

ONE MAN'S WORK

—WITH THE—

TABOR AUTOMATIC MOLDING MACHINE.



DUPLEX MACHINE.

Molds both parts of flask at one operation of machine, thus making two machines in one.

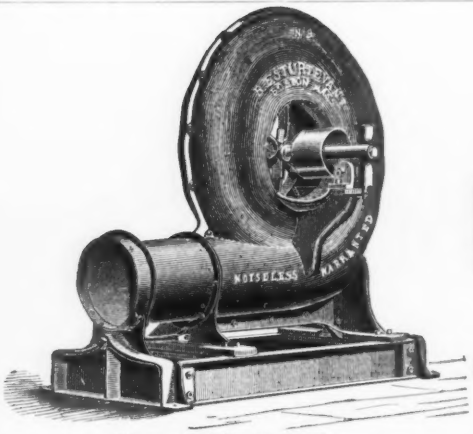
These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth N. J., and see the machines in operation.

The Tabor Manufacturing Co.

OFFICE AND WORKS—
FRONT AND FRANKLIN STS. — Elizabeth, N. J.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

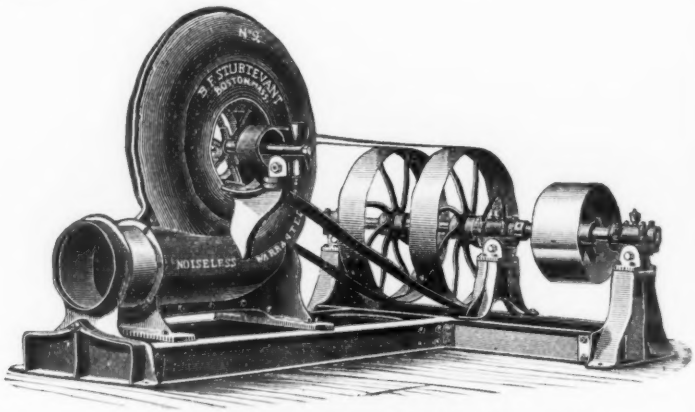
—FOR—

Cupola Furnaces and Forge Fires.

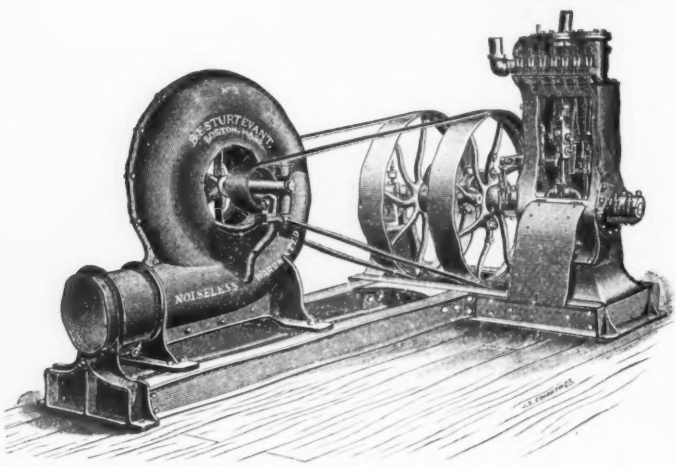
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

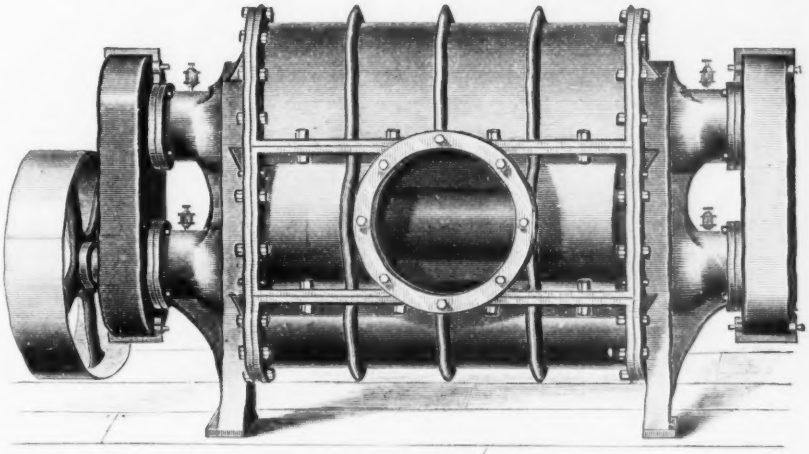
BOSTON, MASS.

91 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Green Rotary Pressure Blower

GIVES THE MOST AIR FOR A $.



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

GIVES THE MOST AIR FOR A $.

SEND FOR CATALOGUE.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

P. G. COCHRAN, Pres. JOHN H. WURTZ, Secretary
J. R. LAUGHREY, Treas. J. S. NEWMYER, Mgr.

Washington Coal & Coke Co

(CAPITAL PAID-UP $250,000.)

MANUFACTURERS OF

HIGH GRADE COKE

We Make a specialty of 72 Hour
Foundry Coke.

N. P. HYNDMAN, Sales Agent,

Room 8, Conestoga Building, 7 Wood St.

General Office, DAWSON, PA. PITTSBURG, PA.

DIRECTORY OF LEADING PIG IRON DEALERS.

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

HENRY H. ADAMS & CO.

(Incorporated)

PIG IRON

Sole Agents for the Celebrated "NORWAY," for combined Strength and Softness.

177 Broadway,
NEW YORK CITY, N. Y.

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,
Philadelphia.

THE DOMHOFF & JOYCE CO.

PIG IRON COMMISSION.

CINCINNATI.

CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

DAYTON COAL & IRON CO.

(Limited.)

PIG IRON.

DAYTON, Tenn. CINCINNATI, Ohio.

F. A. COODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

THE MARSHALL IRON

An old fashioned Pennsylvania Iron for high grade machinery.

The Juniata Furnace & Foundry Co.

Beach & Marlborough Sts.,

C. T. Holbrook, Sole Agent. PHILADELPHIA.

MILLER, WAGONER & BENTLEY,

PIG IRON.

Steel, Ore, Coke and Cinder.

Long Distance Telephone No. 842. COLUMBUS, OHIO.

PICKANDS, BROWN & CO.,

Manufacturers, Importers and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO.

BUFFALO,

PHILADELPHIA, NEW YORK,

ST. LOUIS

A Good Thing is Always Appreciated!

Our design captured the order of the CHATTANOOGA FOUNDRY & PIPE WORKS, Chattanooga, Tenn. for . . . . . .

EIGHT ELECTRIC SWING CRANES

FOR THEIR PIPE FOUNDRY

If you have not investigated the merits of our Cranes, it will pay you to do so before placing orders.

The Phœnix Iron Works Co.,

WASON STREET, CLEVELAND, O.

Builders of Modern Cranes.

EASTERN OFFICE, H. W. JENNINGS, AGENT. FULTON AND CLIFF STS., NEW YORK.

NEW ENGLAND OFFICE, THE JOHN WALES CO., BOSTON, MASS.

CORRESPONDENCE SOLICITED.

MENTION THE FOUNDRY.

Over 10,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries

In addition to 400 Railroads and over 300 Contractors.

ROSS-MEEHAN FOUNDRY CO.,
CHATTANOOGA, TENN., May 5, '96.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensible to us.

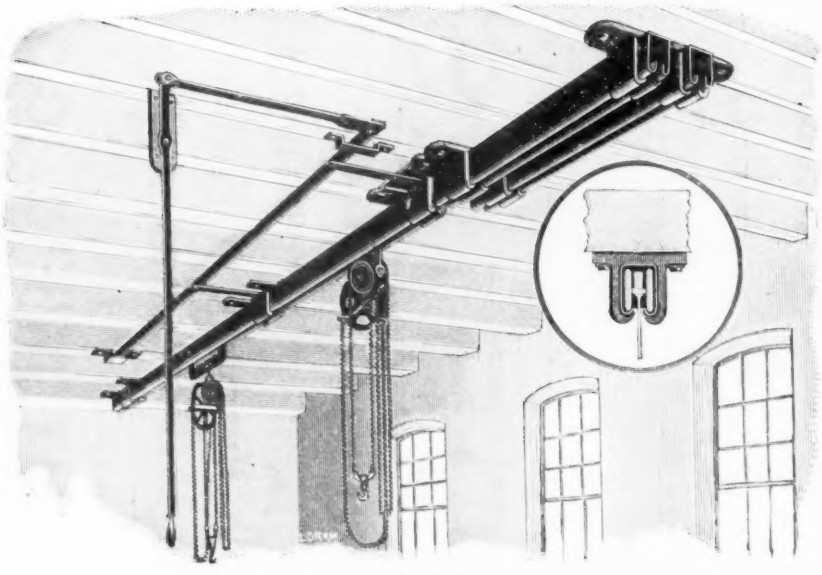
Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.

EDWARD ROBINSON, Sole Proprietor.

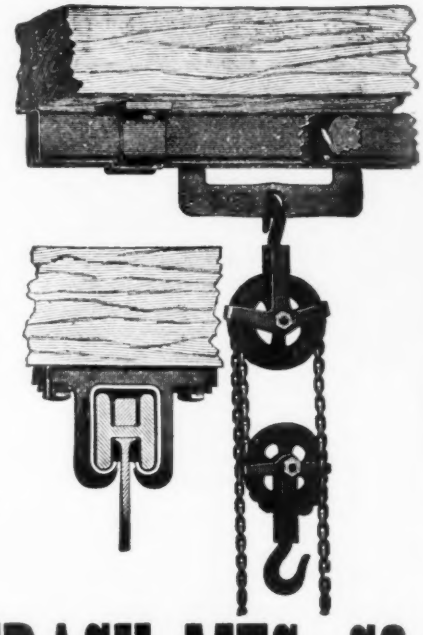
MENTION THE FOUNDRY. **44-46 WASHINGTON STREET, NEW YORK.**



THE PATENT

Overhead Trolley Track System

Is the coming improvement in the iron foundries of this country and in many cases can be made to pay for itself in a few months.



Just the thing for

Carrying Iron from Cupola to Floors.
Carrying Castings from Floors to Cleaning Rooms. . . . .
Lifting, Rolling or Moving Flasks. .

All who have adopted this system have expressed themselves as being delighted with it.

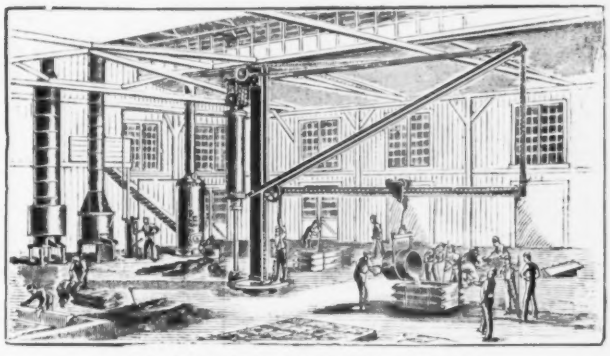
Write us for Circulars, Estimates and Full Particulars.

COBURN TROLLEY TRACK MFG. CO.

HOLYOKE, MASS.

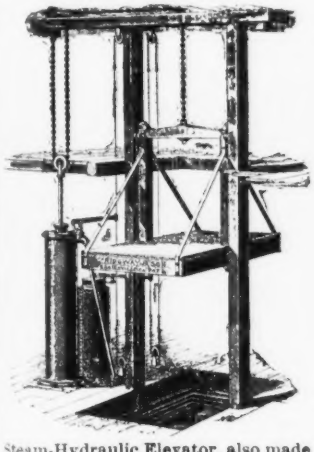
"RIDGWAY, YOU TALK WELL, but—"

Well, here are the credentials, then. Just tarry a moment and see who they are that get Ridgway Cranes. Don't need to give post office addresses with these kind of firms You may be slow, but there are others who are not. Here are some of them:



5-ton Steam-Hydraulic Crane in a Foundry.

National Tube Works Co.
Chapman Valve Co.
Ransselaer Mfg. Co.
A. B. Farquhar & Co.
Penna. Steel Co.
A. A. Griffing Iron Co.
Gray's Ferry Foundry Co.
Harrison Boiler Works.
Evnon-Evans Co.
Hughes & Patterson.
American Tube Co.
Delaware Iron Co.



Steam-Hydraulic Elevator, also made direct acting with cylinder under platform.

Orr & Sembower.
Pittsburg Steel Casting Co.
Solid Steel Co.
Benj. Atha & Co.
Valk & Murdock Co.
Danville Foundry Co.
Murray Iron Works.
National Supply Co.
Henry McShane Co.
Rob't Wetherill & Co.
Hoopes & Townsend.
Reading Iron Co.
Isaac Johnson & Co.
Fairfield Copper Co.
Phoenix Iron Co.
Colorado Fuel Co.
Frazer & Chalmers.
John Q. Denny.
Hartman Mfg. Co.
W. W. Kurtz & Co.
Kelley & Jones Co.
Sterling Mfg. Co.
J. I. Case Co.
Buffalo Cast Iron Co.
Leland & Falconer Co.
Crane & Breed Co.
Gaar, Scott & Co.

Lord & Burnham.
Kellogg Weldless Tube Co.
Blankley Bros. & Co.
Geo. V. Cresson Co.
Johnson Co.
Ingersoll-Sergeant Drill Co.
Waterbury Brass Co.
Kilmer Mfg. Co.
Otis Elevator Co.
New Haven Rolling Mill Co.
Old Dominion Iron & Nail Co.
New Phila. Rolling Mill Co.
Akron Iron Co.
Buffalo Furnace Co.
Nova Scotia Iron & Steel Co.
Bellaire Nail Works.
Benwood Steel Co.
Catasauqua Mfg. Co.
Illinois Steel Co.
Atlantic Refining Co.
American Wire Nail Co.
Cobb & Drew.
John Brennan & Co.
Standard Iron Co.

And a whole grist more of them. So, you see, we haven't been telling fairy stories when we have talked about this crane.

"PLEASE TAKE THE ELEVATOR."

THE GREATEST ELEVATOR THERE IS.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

THOUSANDS OF DOLLARS

Are thrown away annually by Foundrymen who overlook the great waste that occurs in the amount of Iron that is cast away with cinders.

Tumbling Barrels save a great deal, but still many foundries throw away a great number of tons in the course of a year.

Here is what one well-known concern that has used our Separator for many years has to say of it:

Griffin Wheel Company,

Car Wheels of every description,

Chicago.

Dec. 6th., 1895.

The Audubon Machine Works,

41 Whitney Bldg., New Haven, Conn.

Gentlemen:-

We are in receipt of your favor of the 2nd. inst. The Separater Machine recently purchased of you does not replace the one of your make which we have in use here, but is to be put into service by us at our Denver Plant. We, however, consider the machine satisfactory in all respects and have no objection to giving you a testimonial to that effect.

Yours truly,

IN YOUR REPLY REFER TO.....

GRIFFIN WHEEL COMPANY,

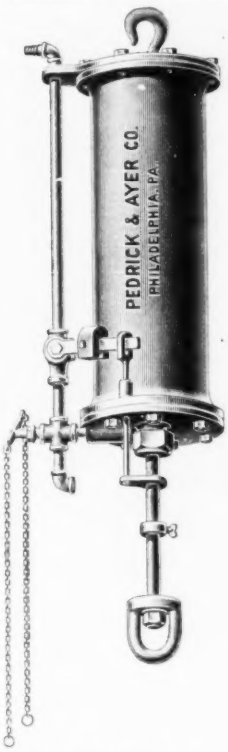
A. Ostmann

Secretary.

It will pay for itself in a short time, and afterwards it will start to pay you.

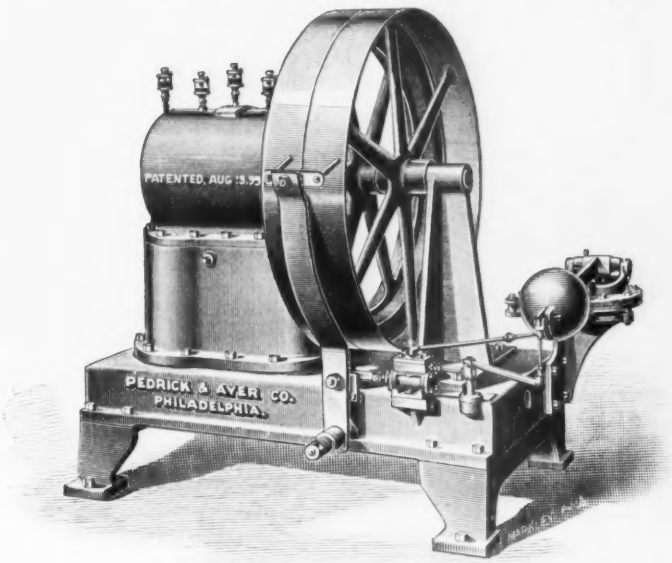
THE AUDUBON MACHINE CO.

NEW HAVEN, CONN.



Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.



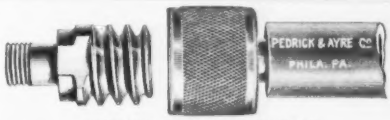
Straight Lift Hoist.

Built in two sizes, Nos. 1 and 2.

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11x 6 6x 6	100-160	32- 50	2-3½	40x4½	2875 lbs.	60x40	Parian
2	1 x10 8x10	90-120	90-120	5-7	60x6	5370 lbs.	76x60	Parish

HORIZONTAL HOIST.

PAT. SEPT 4TH 1894.



AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no atiention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size msde in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

PEDRICK & AYER CO.

SPRING GARDEN STATION, PHILADELPHIA.

Sand Mixer

IT IS

EFFECTIVE.
EXPEDITIOUS
ECONOMICAL

IT SAVES

TIME
LABOR
MONEY

A new, simple and practical method of **preparing Sand for Molds or Cores,** superseding the old time methods of drying and riddling. Damp Sand is in just the proper condition for working.

The saving in labor alone soon repays the cost of the apparatus.

The apacity depends entirely upon the facilities for feeding sand into the hopper, this may exceed 10 tons an hour. Two men will easily shovel 5 tons an hour by hand into the machine. One handling is, in ordinary work, all that is requisite.

A FEW USERS:

Farrel Foundry & Machine Co.,
Ansonia, Conn.

Westinghouse Air Brake Co.,
Wilmerding, Pa.

I. P. Morris & Co.,
Phila., Pa.

McConway & Torley Co.,
Pittsburgh, Pa.

Deane Steam Pump Co.,
Holyoke, Mass.

Erie Malleable Iron Co.,
Erie, Pa.

E. Chicago Foundry Co.,
E. Chicago, Ind.

Maher & Flockhart,
Newark, N. J.

Murray Iron Works Company,
Burlington, Iowa.

Newport News Iron and Brass Works,
Newport News, Va.

William Sellers & Co. Incorp.

PHILADELPHIA.

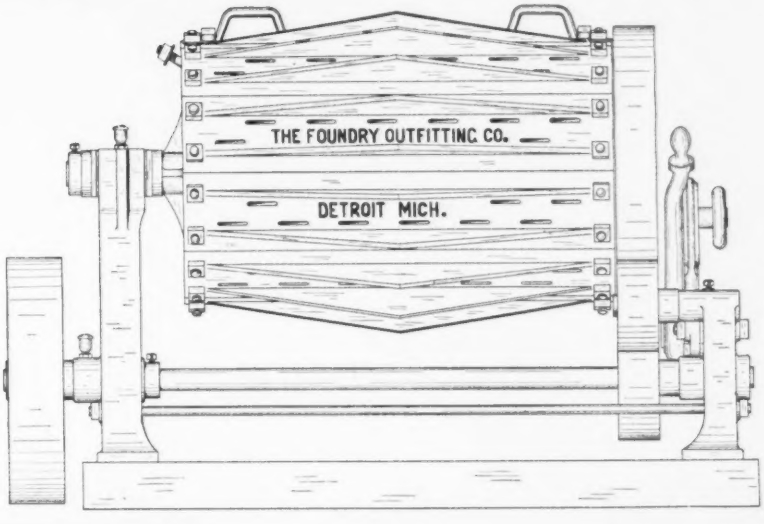
Cupola Furnaces
Blowers
Cranes
Compressors
Hoists
Elevators
Foundry and
Core Oven Cars
Ladles
Reservoirs

The Latest

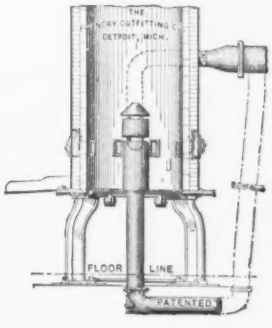
... IS OUR

New Friction Mill

It embodies all the very latest improvements in that line. Easy to operate. Uses very little power. A number of them can be run on the same shaft, using only one belt. It can be started or stopped in a moment by lever shown in cut.



Tumbling Mills
Core Ovens
Sand Sifters
Brass Furnaces
Testing Machines
Trolley Tracks
Foundry Lights
Flasks
Fire Brick
Fire Clay
Molding Sand



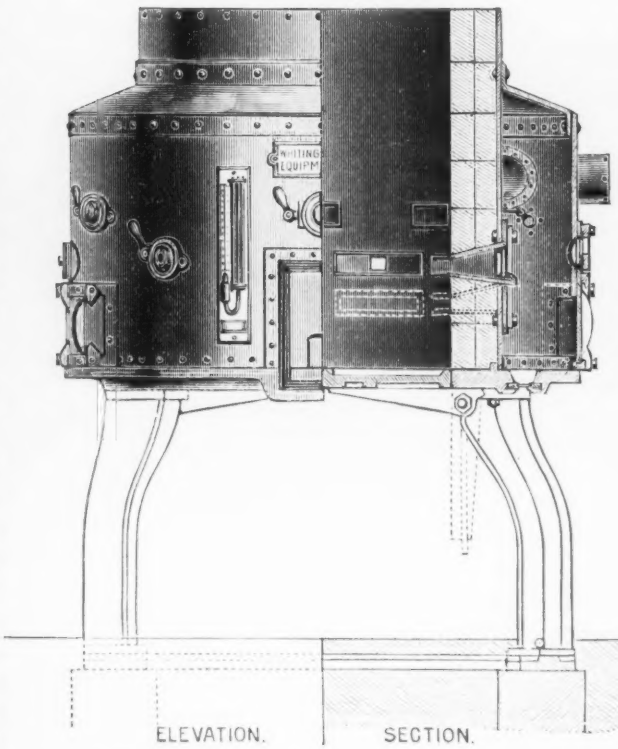
The Center Blast Cupola

IS STILL ON TOP!

The Foundry Outfitting Co.

DETROIT, MICH.

COMPLETE
FOUNDRY EQUIPMENT



Ladles

Trucks

Elevators

Tumblers

Sand Sifters

Turn Tables

The Whiting Cupola.

ADOPTED by over three hundred high-class Foundries. Unexcelled for fuel economy and all-round efficiency. A rapid melter. Saves lining. Gives hot iron. No experiment—an established success. Fourteen sizes. Send for circulars and our new prices. A good time to buy.

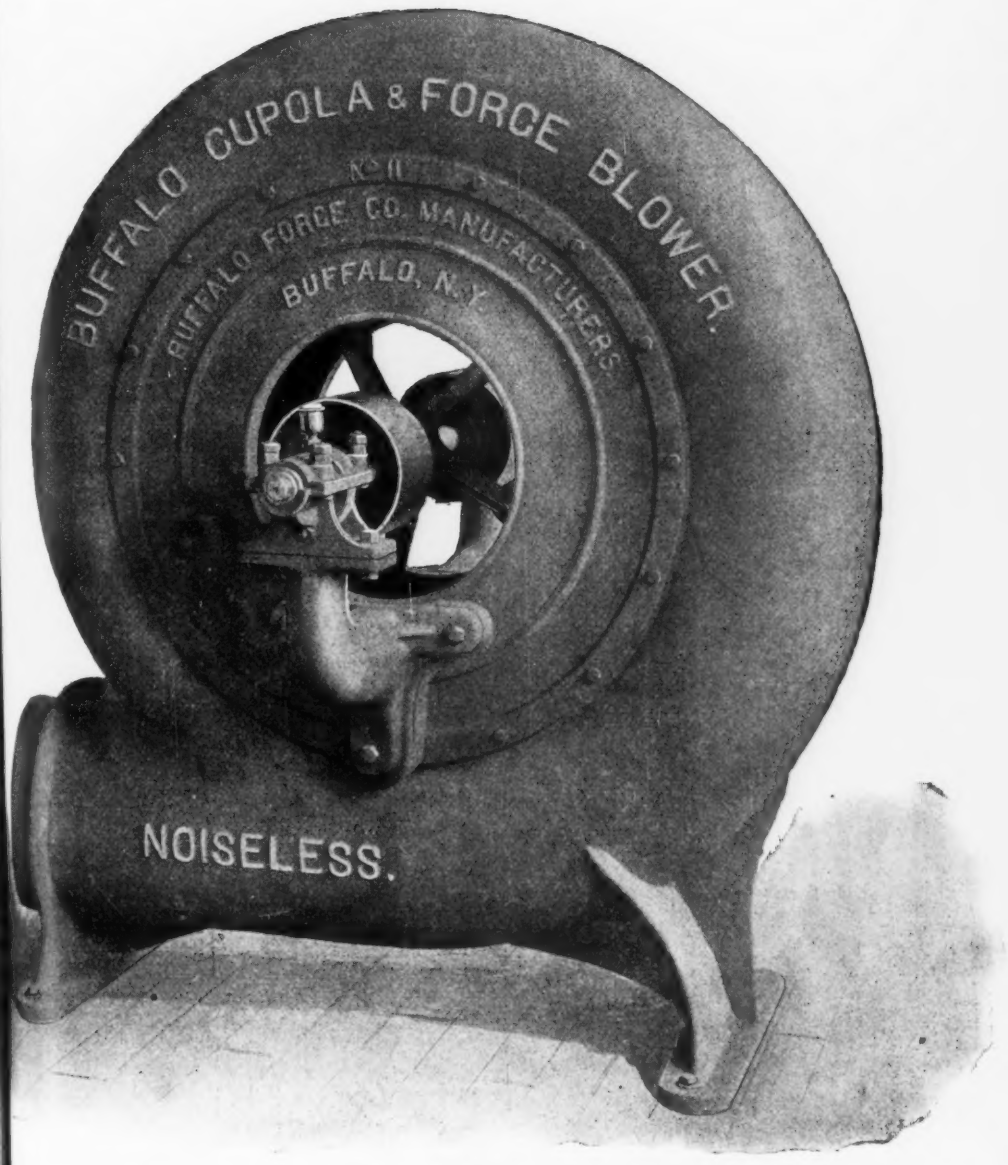
IMPROVED

Air Hoists and Cranes.

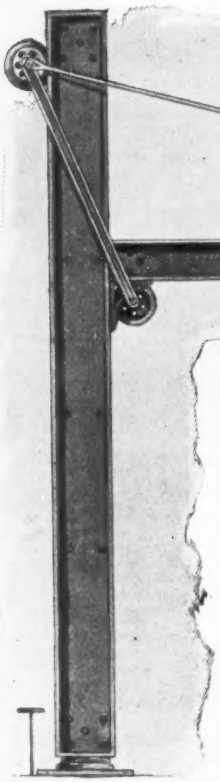
"TYPE A" Hoist, for Foundry use, has an adjustable speed valve. The load may be held under pressure in any position. Patent exhaust attachment. Safety check. All sizes. Send for prices and circulars.

Whiting Foundry Equipment Co.

WORKS: Harvey, Ill. CHICAGO OFFICE: 1522 Monadnock Block.



Furnished with Combined Adjustable Bed and Countershaft where desired.



DO YOU NEED **CRANES?**

WE MAKE CRANES

. . . . ASK FOR OUR PRICES ON CRANES

With our special tools we make **Flange Pipe** at low cost. Let us name you prices when you require . . . .

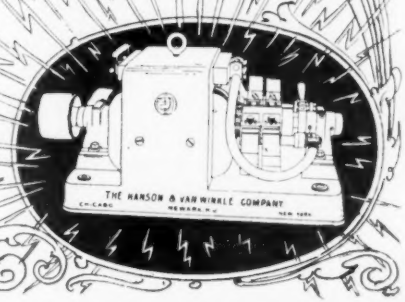
HUB OR FLANGE PIPE AND FITTINGS.

We may be able to supply them to you at less than your cost. . . . . .

The Addyston Pipe and Steel Co.

CINCINNATI, OHIO.

NICKEL-PLATING OUTFITS



THE
HANSON & VAN WINKLE
COMPANY.
NEWARK, N.J.
CHICAGO. NEW YORK.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page - -	per month, $20.00
Half page - - -	" 12.00
Quarter page - -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

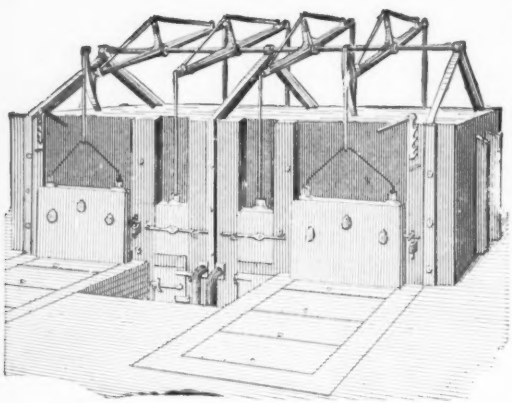
Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates thus giving it to all alike, and no reduction of any sort on the above rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

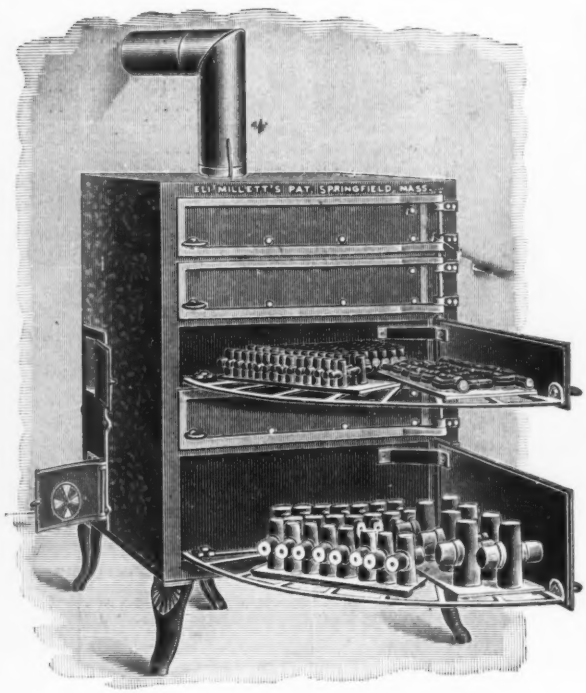
BROWN & SHARPE MANF'G. CO.

PROVIDENCE, R. I.



Foundry Rattlers
Annealing Ovens
Sanitary Closets
Core Ovens
Case-Hardening Furnaces . . . .

FINE CASTINGS A SPECIALTY.



Millett's Patent Core Oven

THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

Over one hundred and fifty in use.

SEND FOR OUR NEW CATALOGUE GIVING NAMES OF THOSE USING THEM.

Millett Core Oven Co.

BRIGHTWOOD, MASS.

For Sale by J. W. PAXSON & CO. Philadelphia, Pa.

BUYERS' DIRECTORY.

ALUMINUM.
Cowles Electric Smelting & Aluminum Co., Lockport, N. Y.

AIR HOISTS.
Whiting Foundry Equipment Co., Harvey, Ill.

BARROWS, TRUCKS, ETC.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Lansing Wheelbarrow Co., Lansing, Mich.
Syracuse Chilled Plow Co.

BLOWERS.
Buffalo Forge Co., Buffalo. N. Y.
Connersville Blower Co., Connersville, Ind.
Garden City Fan Co. Chicago, Ills.
Root, P. H. & F. M. Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass
Wilbraham Baker Blower Co., Philadelphia, Pa.

BRONZES.
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

CHARCOAL.
Springfield Facing Co., Springfield, Mass.

COKE.
Washington Coal and Coke Co., 7 Wood St., Pittsburg, Pa.

CORE COMPOUNDS.
American Glutrose Works, Philadelphia, Pa.
Stewart, W. H., 182 Front St., New York.
Vreeland Tompkins, Jersey City, N. J.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
Lansing Wheelbarrow Co., Lansing, Mich.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Foundry Outfitting Co., Detroit Mich.
Whiting Foundry Equipment Co., Chicago.

CRANES.
Addyston Pipe and Steel Co., Cincinnati, O.
Craig Ridgway & Sons, Coatesville, Pa.
Harrington, E., Sons & Co., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Shaw Electric Crane Co.
Wm. Sellers Co.
Whiting Foundry Equipment Co., Harvey, Ill.

CRUCIBLES.
Joseph Dixon Crucible Co., Jersey City, N.J.
McCullough-Dalzell Co, Pittsburg, Pa.
Taylor Crucible Co., Robt. J., Philadelphia, Pa.

CUPOLAS.
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

FIRE-BRICK.
Brooklyn Fire Brick Works, Brooklyn, N. Y.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.

FLEXIBLE SHAFTS.
Stow Flexible Shaft Co., Binghamton, N. Y.
Chicago Flexible Shaft Co., Chicago, Ill.

FOUNDRY LADLES.
Foundry Outfitting Co., The, Detroit.
Obermayer Company, The S., Cincinnati, Ohio.
Paxson & Co., J. W., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whiting Foundry Equipment Co., Harvey, Ills

FOUNDRY PLANS.
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ills

FOUNDRY SUPPLIES.
Springfield Facing Co., Springfield, Mass.
Foundry Outfitting Co., The, Detroit, Mich.
Joseph Dixon Crucible Co. Jersey City, N J.
J. S. McCormick Company.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson & Co., J. W., Philadelphia, Pa.
Smith Foundry Supply Co., Cincinnati, O.
The U. S. Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., New York.

IRON BUILDINGS.
Berlin Iron Bridge Company, East Berlin, Conn
Wrought Iron Bridge Company, Canton, Ohio.

IRON FILLER.
Vreeland Tompkins, Jersey City, N. J.

MANGANESE AND SILICON.
Cowles Electric Smelting and Aluminum Co., Lock port, N. Y.

MOLDING MACHINES.
Tabor Mfg. Company, 39 Cortlandt st., New York
The Adams Co., Dubuque, Ia.

MOLDING SAND.
E. M. Ayers, Zanesville, O.
Foundry Outfitting Co., The, Detroit.
Garden City Sand Co., Chicago, Ill.
Paxson & Co., J. W., Philadelphia, Pa.
Whitehead Bros. Co., New York.

NICKLE PLATING OUTFITS.
Hanson & Van Winkle Co., Chicago.

PATTERN MAKERS.
The Gobeille Pattern Co., Cleveland, Ohio.

PATTERN MAKERS SUPPLIES.
Frank H. Clement Co., Rochester, N. Y.
The J. A. Fay & Egan Co., Cincinnati, Ohio.

PLATERS SUPPLIES.
Hanson & Van Winkle Co., Chicago.

POLISHERS SUPPLIES.
Hanson & Van Winkle Co., Chicago.

SAND SIFTERS.
Wm. Sellers & Co., Philadelphia, Pa.
Taylor, Wilson & Co. Allegheny, Pa.

SAND BLAST.
Goodrich, & Co., F. A., Detroit, Mich.

SNAP FLASKS.
Diamond Clamp & Flask Co., Richmond, Ind.
Green & Co., C. H., Syracuse, N. Y.

SPRUE CUTTERS.
Gould & Eberhardt, Newark, N. J

TROLLEY TRACKS.
Coburn Trolley Track Mfg. Co., Holyoke, Mass

TUMBLING BARRELS.
Brown & Sharpe Mfg. Co., Providence, R. I.
Paxson & Co., J. W., Philadelphia, Pa.
Stover Mfg. Co., Freeport, Ills.
Whiting Foundry Equipment Co., Harvey, Ills.

VENTILATOR IRONS.
Delvin, Thos. & Co. Philadelphia, Pa.

AIR * COMPRESSORS

IN FOUNDRIES

High Grade Compressors

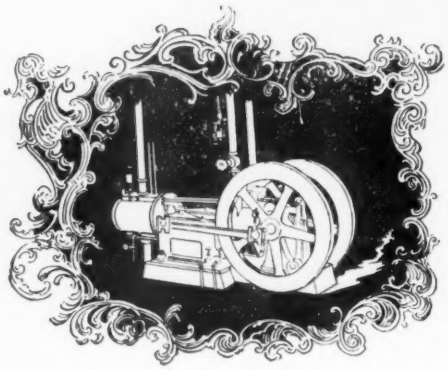
Steam or Belt Driven

Manufactured by

THE

Ingersoll-Sergeant Drill Co.

Havemeyer Building, New York.



Send for Catalogue.

WORK WONDERS

USED FOR

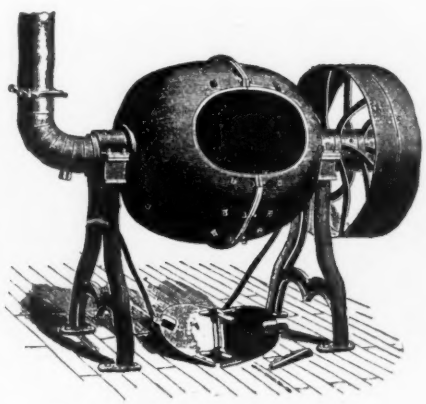
Sand Blasts

Lifting Castings,

Placing Cores in Position, etc.

STOVER'S IMPROVED

EXHAUST TUMBLING BARREL



The Stover Egg Shaped Barrel does double the work of any other with less noise and power.

It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

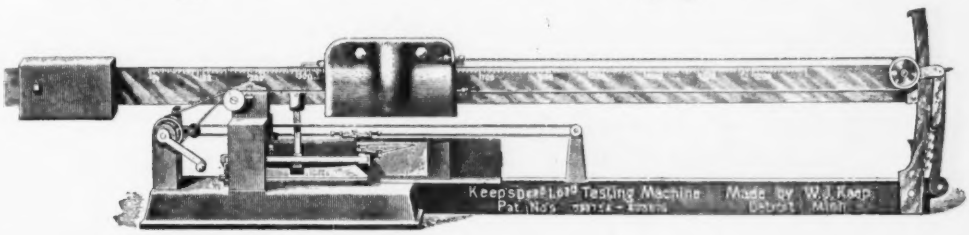
For full particulars, address,

Stover Manufacturing Co.

205 RIVER STREET,

FREEPORT, ILL

"Keep's Test" Apparatus.



HERE IS WHAT ONE LARGE CONCERN SAYS:-IT HAS PAID THEM, WHY NOT YOU?

DETROIT, MICH., March 31st, 1896.

Mr. W. J. Keep, City:

DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

Very truly yours,
LELAND & FAULCONER MFG. CO.,
H. M. LELAND, Vice-President.

To SAVE MONEY IN YOUR OWN FOUNDRY, ADDRESS **W. J. KEEP, Detroit, Mich.**

Boutelle's Improved Snap Flask

FOR HEAVY WORK.

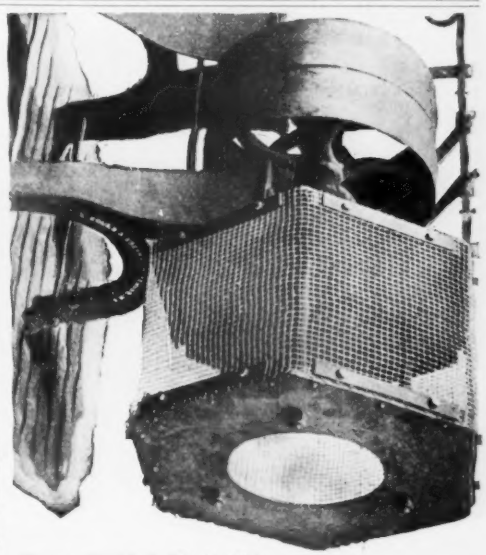
PATENTED JULY 17, 1894.

NO STRAINING OF WORK.

SAVES Floor Space
SAND
TIME
MONEY

Send for Circulars and Price List.

L. W. BOUTELLE,
ORANGE, MASS.



Messrs. Gould & Eberhardt:

NEWARK, N. J. Aug. 19, 1896.

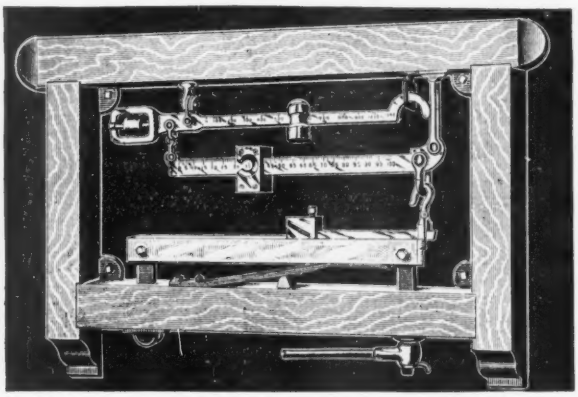
GENTLEMEN:- I have two of your Sand Sifters in use, and find them an excellent device for the preparation of Core and Facing Sand, as they sift and mix thoroughly, run with small amount of power, save the labor of one man even when run intermittently, and require but little care to keep in order. The finer seive is used as a dry Sifter and Mixer, the coarser one as a Mixer after the material is wet down. Yours truly,

S. J. MEEKER.

GOULD & EBERHARDT, NEWARK, N. J.

SPERRY'S TESTING MACHINE

For showing Transverse Strength of Foundry Test Bars.



If you are interested in Testing Machines (an Iron Founder cannot afford not to be) we wish to show you what our machine will do for you.

Results can be compared with published tables.

It gives you the breaking strain and deflection of a one-inch square specimen one foot long, fixed at one end, weight applied to the other. This determination is standard. Your results may be compared with published tables. (See Haswell on Strength of Materials.) No other low cost machine does this. The broken end of specimen is only about two and one-half inches long and can be marked and filed away for future reference.

The specimen does not require balancing as in other machines. The pressure applied can never be anything but the resistance of the specimen.

No floor space is occupied. A wall space of seventy by forty-two inches is all that is required. The machine frame is constructed of 6x6 timber, nicely moulded and finished in hard oil. The Scale Beam is finely nickel-plated, has no loose weights and is made by the Howe Scale Co. As a whole, the machine is an ornament to your office or shop.

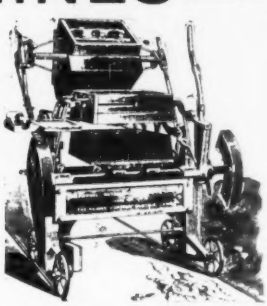
Price, Complete as shown above, $100.00.

BORDEN & SELLECK CO.

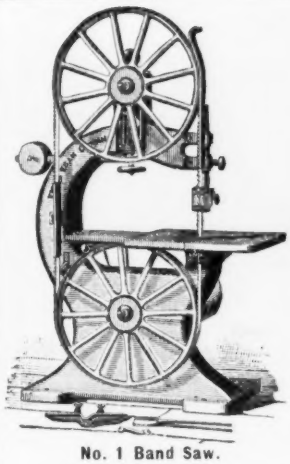
48 and 50 LAKE STREET, CHICAGO.

WE MOURN FOR THOSE WHO DO NOT KNOW
THE GOBEILLE PATTERN CO. CLEVELAND, O.

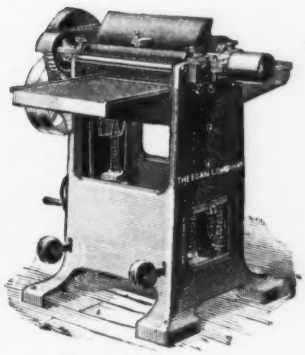
FARWELL'S **MOULDING MACHINES** Send for Catalogue



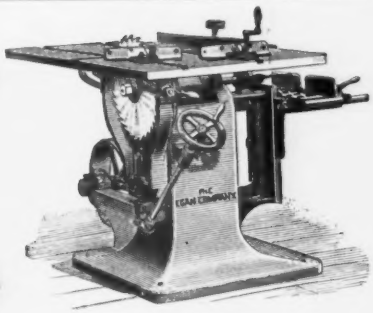
THE ADAMS COMPANY, DUBUQUE, IOWA



No. 1 Band Saw.
Iron Tilting Table.



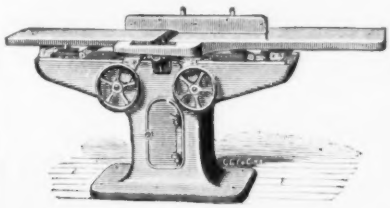
No. 1 Surface Planer.



No 3 Variety Saw.
Tilting Table and Boring Attachment.

Wood Working Machinery

FOR PATTERN MAKERS.



No. 2 Hand Planer.

Complete Line.
Prices and Particulars on application.

THE EGAN CO.

417-437 West Front Street, - - CINCINNATI, OHIO

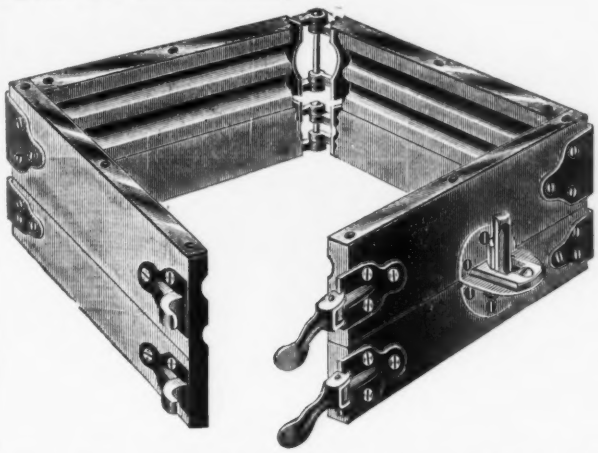
We are the Largest Manufacturers of

SNAP FLASKS

IN THIS COUNTRY, FOR TWO REASONS.

First—Our Flask has been found to be the best in the market and foundrymen insist upon having them, no matter who they buy of.

Second—Making them in such large quantites and using the most improved machinery enables us to sell them cheap.



That is all there is to it—

QUALITY and PRICE.

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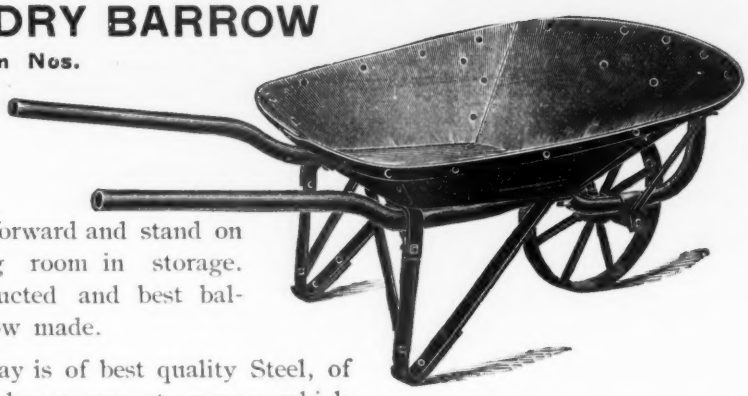

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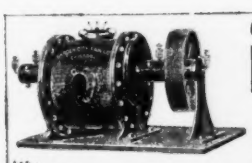

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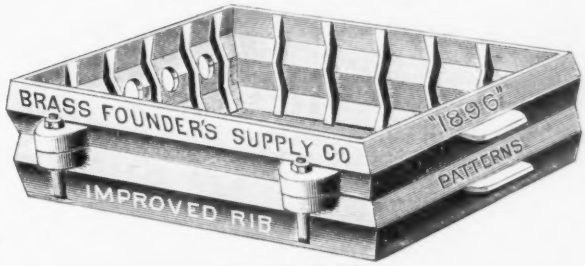

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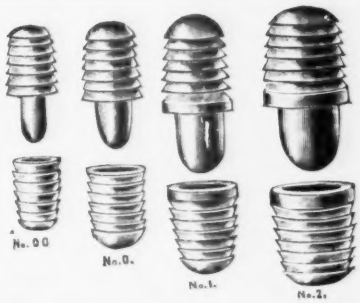

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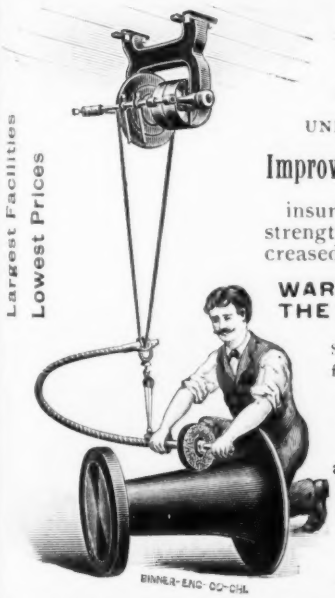

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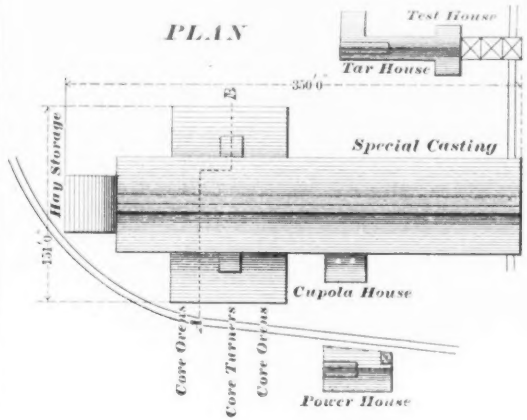

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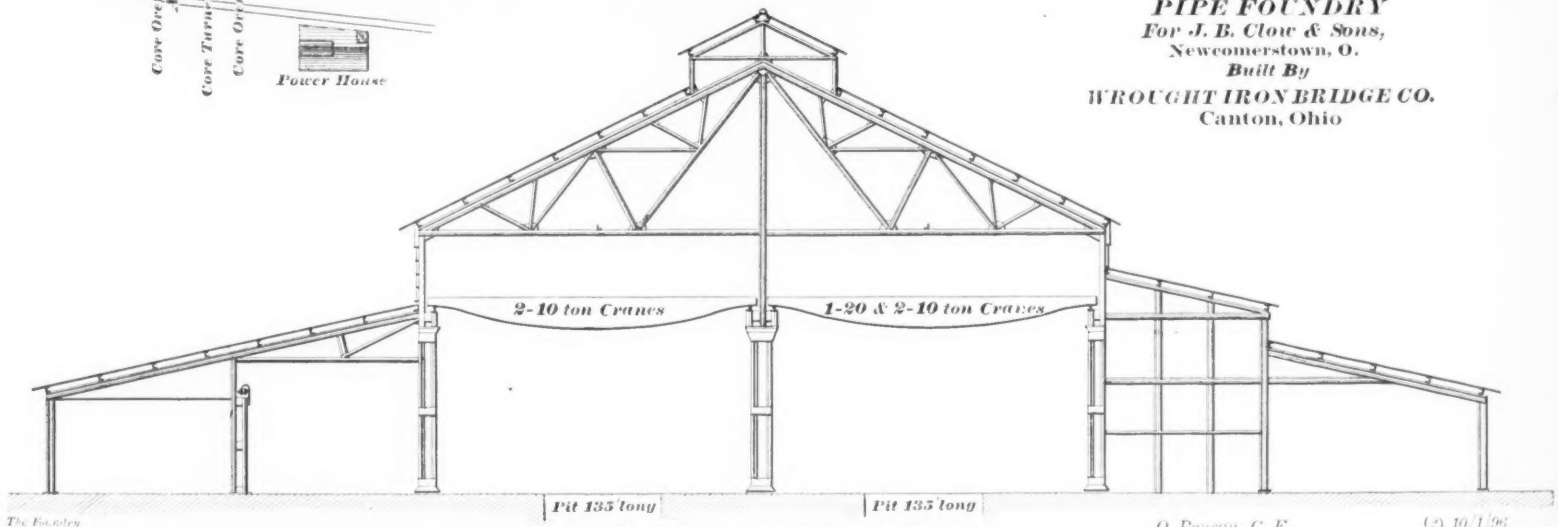

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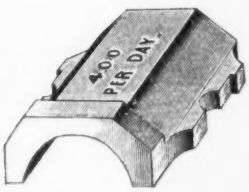

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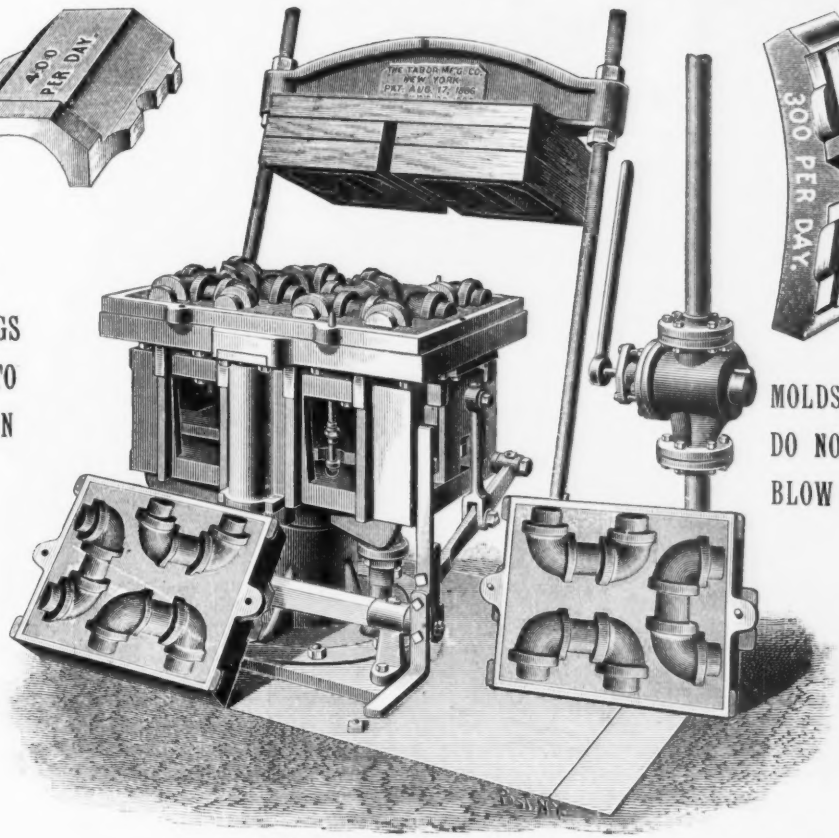

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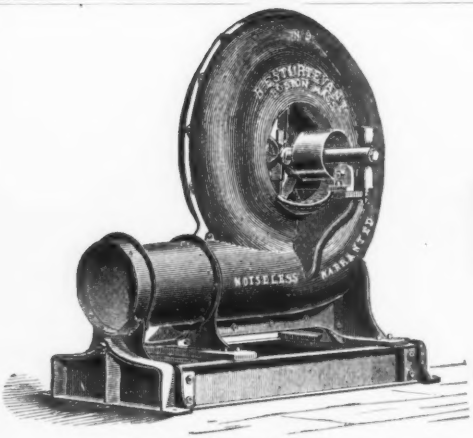

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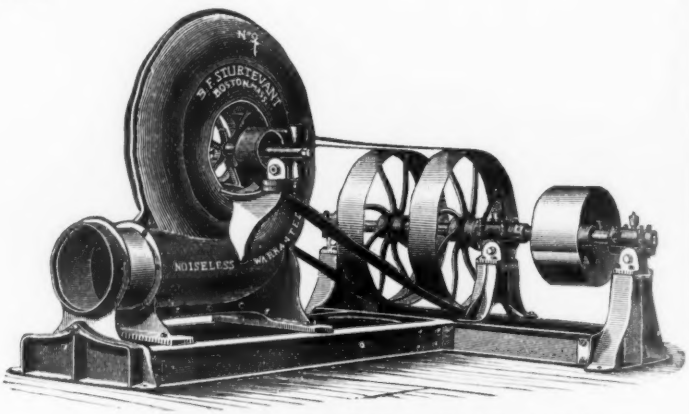

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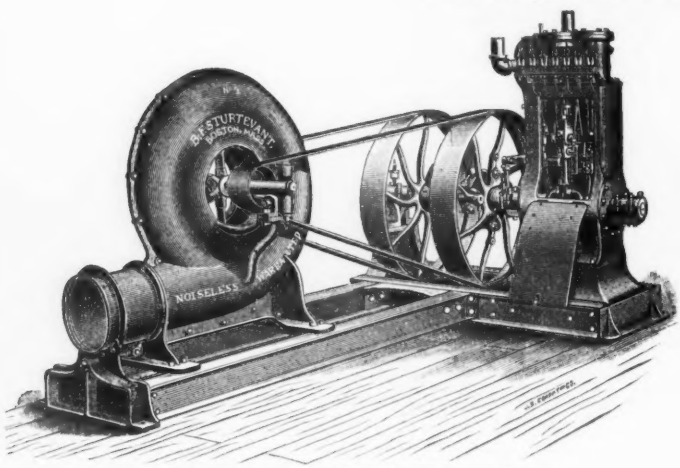

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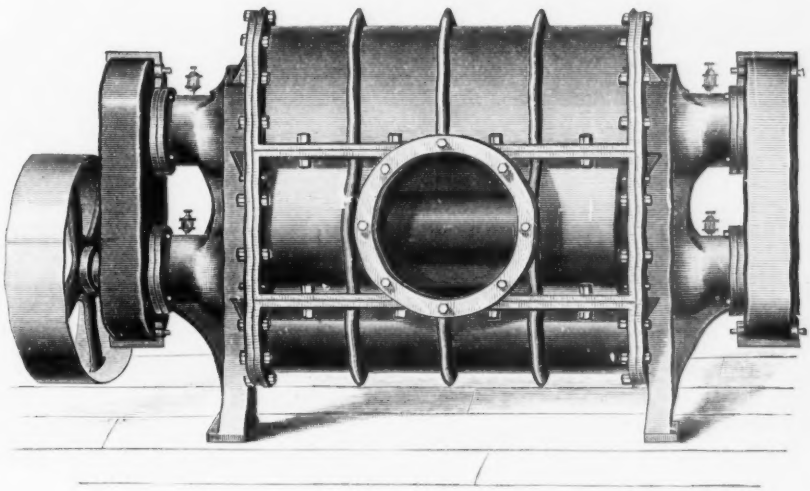

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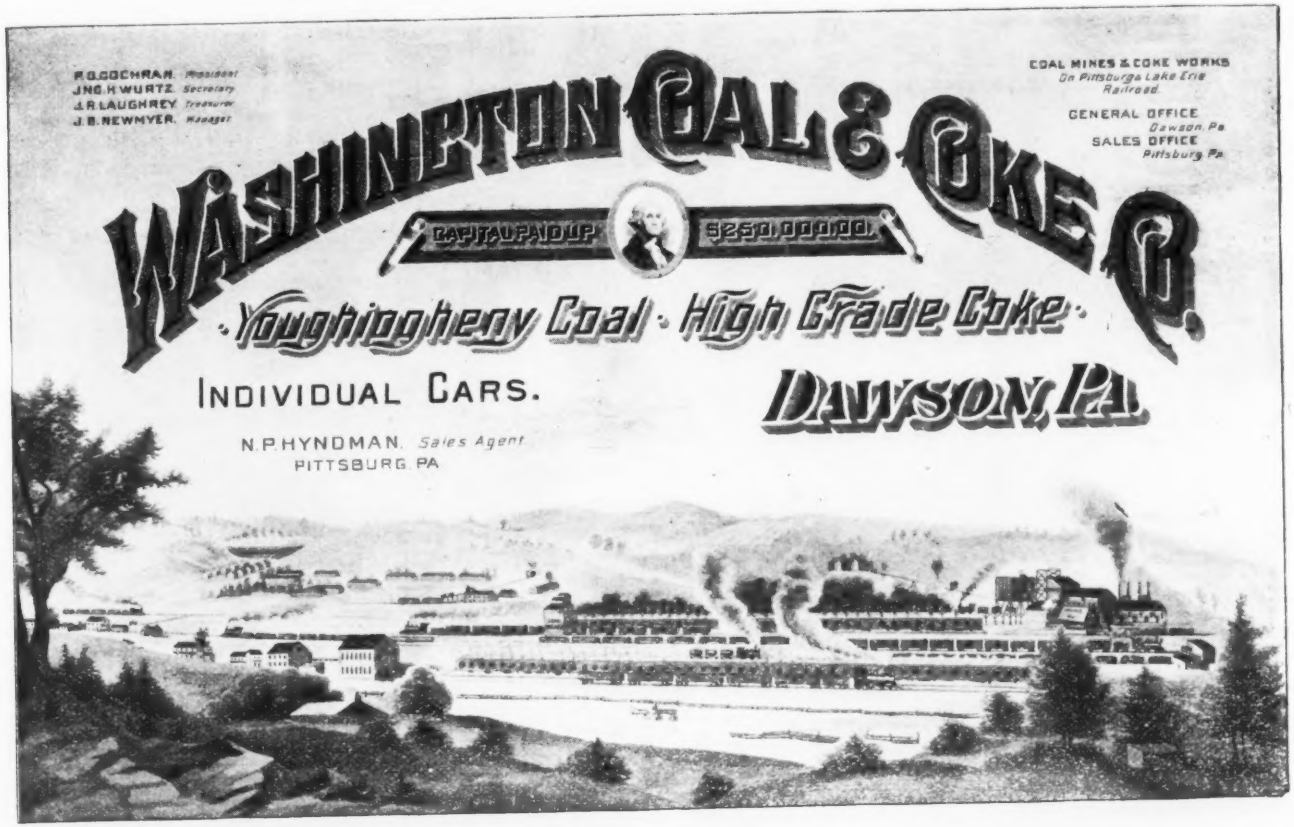
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WASON STREET, CLEVELAND, O.

Builders of Modern Cranes.

EASTERN OFFICE, H. W. JENNINGS, AGENT. FULTON AND CLIFF STS., NEW YORK.

NEW ENGLAND OFFICE, THE JOHN WALES CO. BOSTON, MASS.

CORRESPONDENCE SOLICITED.

MENTION THE FOUNDRY.

Over 10,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries

In addition to 400 Railroads and over 300 Contractors.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.

EDWARD ROBINSON, Sole Proprietor.

MENTION THE FOUNDRY. 44-46 WASHINGTON STREET, NEW YORK.

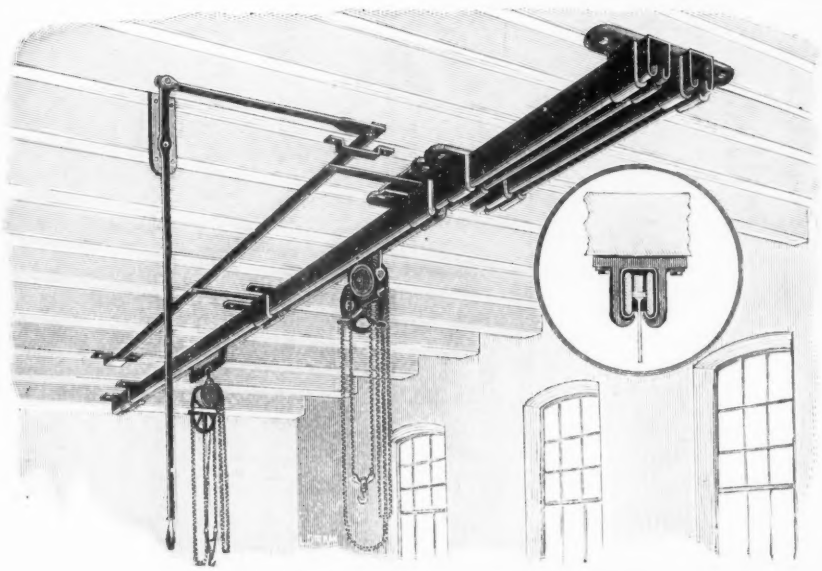
ROSS-MEEHAN FOUNDRY CO.,
CHATTANOOGA, TENN., May 5, '96.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensible to us.

Yours very truly,

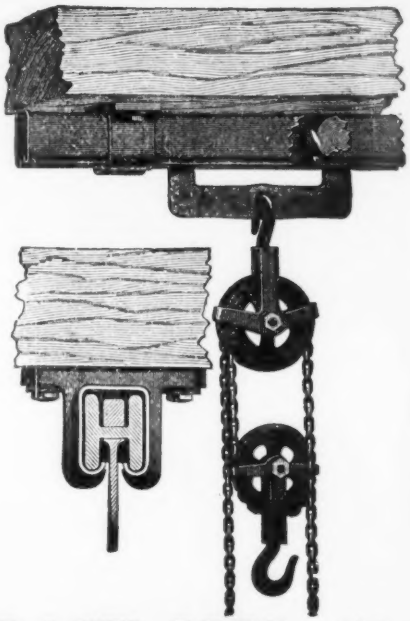
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.



THE PATENT

Overhead Trolley Track System

Is the coming improvement in the iron foundries of this country and in many cases can be made to pay for itself in a few months.



Just the thing for

Carrying Iron from Cupola to Floors.
Carrying Castings from Floors to Cleaning Rooms. . . . .
Lifting, Rolling or Moving Flasks. .

All who have adopted this system have expressed themselves as being delighted with it.

Write us for Circulars, Estimates and Full Particulars.

COBURN TROLLEY TRACK MFG. CO.

HOLYOKE, MASS.

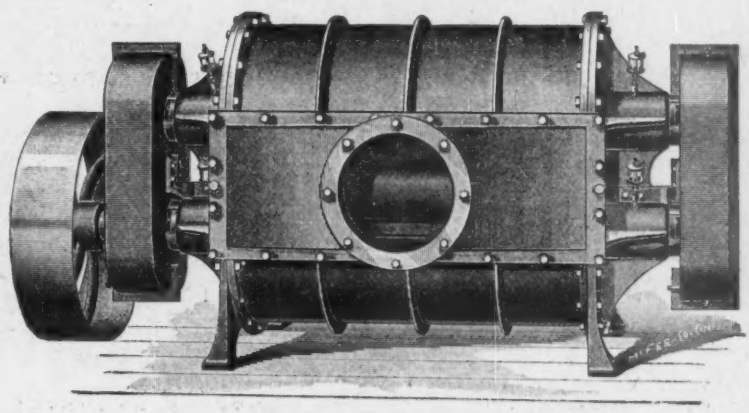
OVER

25,000

ROOTS' POSITIVE PRESSURE BLOWERS

Have been put on the Market.

1859



1896

They are Unequaled.

P. H. & F. M. ROOTS CO.

CONNERSVILLE, IND.

Just Enough Wind

∴ ∵ ∴ and at the right pressure for the best results is what you obtain with a

ROOTS' POSITIVE PRESSURE BLOWER

OUR CATALOGUE is interesting.
OUR TESTIMONIAL SHEET convincing.

WRITE FOR THEM

NO PERIODICAL BREAK-DOWNS AND EXCELLENT SATISFACTION.

ELGIN, ILL., March 11, 1895.

P. H. & F. M. ROOTS Co., Connersville, Ind.:

Gentlemen—We very much regret our tardiness in replying to yours of the 25th ult., but now take occasion to say that we have had in use for a number of years, two No. ½ and one No. 6 Roots Blowers; the last named, replacing a —— Blower, which had caused us considerable annoyance by periodical break-downs. All of the machines are now in operation and are giving excellent satisfaction.

Yonrs truly,
ELGIN NATIONAL WATCH Co.

THEY ARE OPERATING TO OUR ENTIRE SATISFACTION.

LOUISVILLE, KY., April 16, 1895..

P. H. & F. M. ROOTS Co., Connersville, Ind.:

Gentlemen—Replying to your favor of the 12th inst., would say that we have three of your blowers now in use. They are without engine. We take pleasure in writing that they are operating to our entire satisfaction.

Yours respectfully,
DENNIS LONG & COMPANY,
By A. F. Callahan, Sec'y and Treas.

WE HAVE BEEN, PRACTICALLY, AT NO EXPENSE WHATEVER FOR REPAIRS.

SCOTTDALE, PA., April 27, 1895.

P. H. & F. M. ROOTS Co., Connersville, Ind.:

Gentlemen—The No. 6 Blower, with engine combined, which we purchased from you in November, 1889, continues to give good satisfaction. With this Blower and a No. 10 Colliau cupola, we are now melting from sixty-eight to seventy tons of iron per day, and have no trouble whatever in getting sufficient blast just when wanted. We have been, practically at no expense whatever for repairs on the Blower and only a moderate expense on the engine.

Yours respectfully,
NATIONAL FOUNDRY AND PIPE WORKS,
J. D. Hill, Secretary.

P. H. & F. M. ROOTS CO.

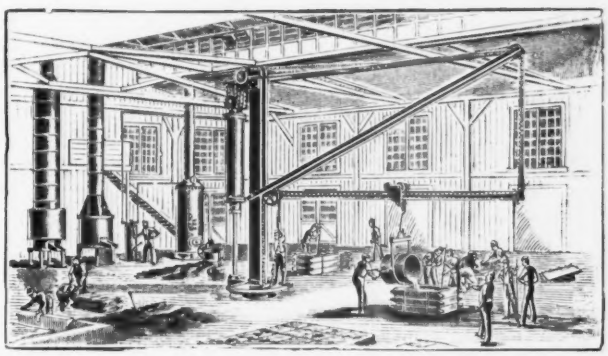
Connersville, Ind

"What is Charity?"

Helping the unfortunate brother out of the ditch; that is "CHARITY," my boy.

And that is what the Ridgway Balanced Steam-Hydraulic Crane has done for many and many a fellow. That is why it is as popular as the Good Samaritan.

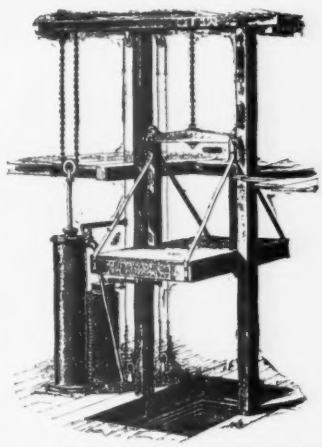
The poor Foundryman was having a sorry enough time of it. Things were not going right in the shop. The place was all cluttered up with flasks and stuff. The men were harum scarum and careless. The work didn't come out in good shape. Lots of bad and scabby castings. Too many laborers were required. Everything seemed slow and wasteful. The men were like the shop, and the anxious, bedraggled foundryman had the "horrors," and was certainly in the ditch on the Jericho road.



5-ton Steam-Hydraulic Crane in a Foundry.

Along came the big-hearted Ridgway Crane, always on the lookout for just such as he, and what a transformation there was in that shop. The place was soon cleaned up and things began to hum. No more scabby castings. Day laborers cut in two. The Ridgway Crane set the pace, and the men soon got to working like the crane. Quickly, Silently, Perfectly. The dollars began to jingle in the office and the foundryman began to smile. Ah, how he loves the Ridgway Crane! Just ask him about it.

Now, we have hard times, and have 'em right, too. In times when everything is dark and gloomy, the Ridgway Crane, like our old friend Mark Tapley, "comes out strong." Many is the fellow who feels like saying "Amen" to that.



Steam-Hydraulic Elevator, also made direct acting with cylinder under platform.

Never was there such a charitable machine as the Ridgway Crane. Scattering benefits wherever men have welcomed it. Relieving expensive men from exhaustive work. Keeping shops and mills a going, and even making some money in times when money is particularly hard to make.

Charity! Helpfulness! Name the equal of this crane if you can.

Faith, Hope, Charity, these three, and the Ridgway Crane is all three of them if you will have it.

"PLEASE TAKE THE ELEVATOR."

Swell Hotels, Department Stores, Big Office Buildings, etc., need not apply.

This is a select machine, only for Iron works and Foundries.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

SHERRY TORCH

MORE

SIMPLE!
EFFICIENT!
PORTABLE!
RELIABLE!
EASILY OPERATED!
AND CHEAPER!

100 TO 4,000 CANDLE POWER,

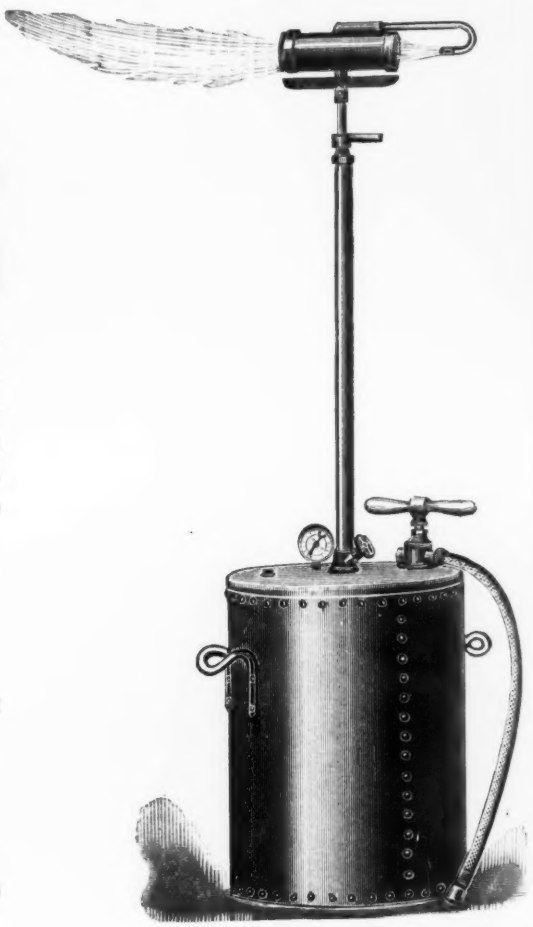
GIVING A CLEAR, WHITE LIGHT.

Indispensible in all places where a Powerful and Portable Light is required.

..FOR..

FOUNDRIES

Boiler Makers, Bridge and Girder Works, Rolling Mills, Forges, Contractors and Builders, Stone Quarries, Ship Yards, Dry Docks, Coal Wharves, Harbor Works, Saw Mills Dredgers, Street Railways, Bridge Building.



Requires No Skilled Labor!
Unaffected by Wind or Rain!
Can be Started in a Few Minutes!

For TERMS and PRICES, Address

Sherry Torch Co.

ROCHESTER, N. Y.

The Edw. P. Allis Co.

Milwaukee, Wis. have the largest foundry (exclusively for machinery castings,) in the United States. Its interior is shown by the following cut. . . . .

The daily melt is from 60 to 90 tons. All the heavy work is done under and handled by **THREE** thirty ton

Shaw Electric Traveling Cranes,

The first of which was put in operation in 1889, the second in 1891 and the third in 1893. Besides these, there are three more Shaw Cranes in the erecting and machine shops.

These Crane are Made Only by

THE SHAW ELECTRIC CRANE CO.

MUSKEGON, MICH.

——And Sold Only by——

Manning, Maxwell & Moore,

424 TELEPHONE BUILDING, PITTSBURG.

60 S. CANAL ST., CHICAGO, ILL. **111 LIBERTY ST., NEW YORK.**

FOUNDRY CRANES

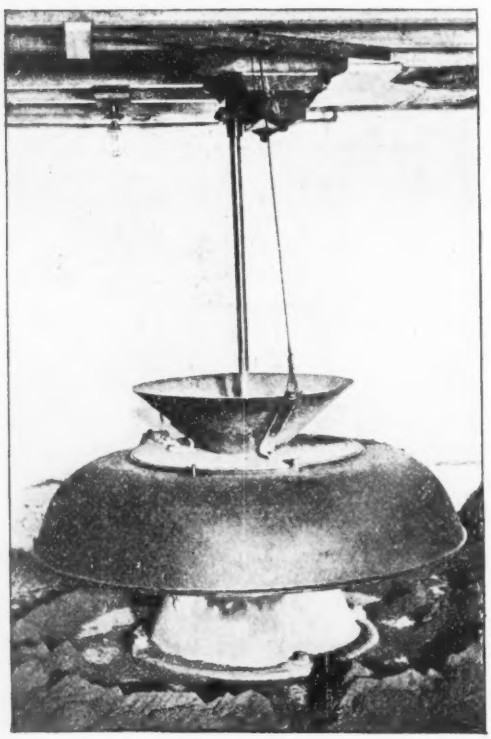
These Cranes are constructed upon thoroughly practical principles. Every detail has been carefully studied and improvements have been added to increase efficiency and economize cost of operation of both **Jib and Traveling Cranes.**

CENTRIFUGAL SAND MIXER!

A new, simple and practical method of **preparing Sand for Molds or Cores,** superseding the old time methods of drying and riddling. Damp Sand is in just the proper condition for working.

The saving in labor alone soon repays the cost of the apparatus.

The Capacity depends entirely upon the facilities for feeding sand into the hopper, this may exceed 10 tons an hour. Two men will easily shovel 5 tons an hour by hand into the machine. One handling is, in ordinary work, all that is requisite.



A FEW USERS:

Farrel Foundry & Machine Co.,
Ansonia, Conn.

Westinghouse Air Brake Co.,
Wilmerding, Pa.

I. P. Morris & Co.,
Phila., Pa.

McConway & Torley Co.,
Pittsburgh, Pa.

Deane Steam Pump Co.,
Holyoke, Mass.

Erie Malleable Iron Co.,
Erie, Pa.

E. Chicago Foundry Co.,
E. Chicago, Ind.

Maher & Flockhart,
Newark, N. J.

Murray Iron Works Company,
Burlington, Iowa.

Newport News Iron and Brass Works,
Newport News, Va.

William Sellers & Co. Incorp.

PHILADELPHIA.

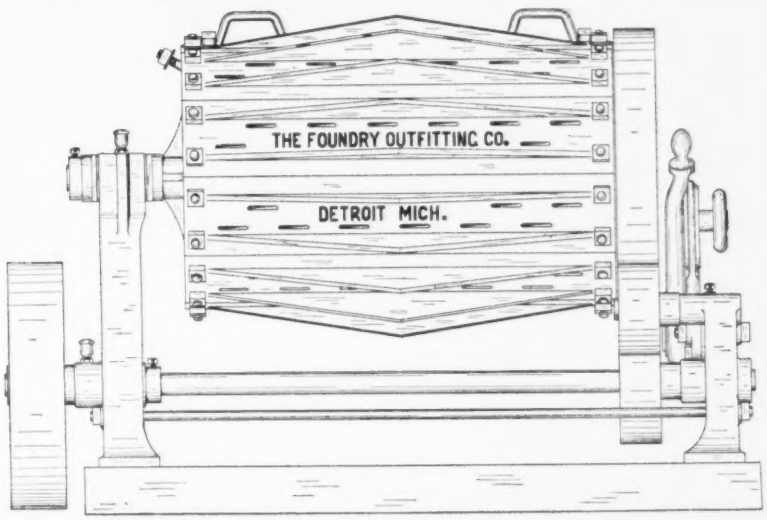
Cupola Furnaces
Blowers
Cranes
Compressors
Hoists
Elevators
Foundry and
Core Oven Cars
Ladles
Reservoirs

The Latest

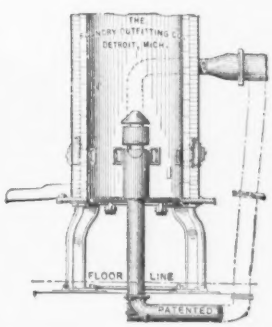
... IS OUR

New Friction Mill

It embodies all the very latest im-
—provements in that line. Easy to operate. Uses very
—little power. A number of them can be run on the
—same shaft, using only one belt. It can be started or
—stopped in a moment by lever shown in cut.



Tumbling Mills
Core Ovens
Sand Sifters
Brass Furnaces
Testing Machines
Trolley Tracks
Foundry Lights
Flasks
Fire Brick
Fire Clay
Molding Sand



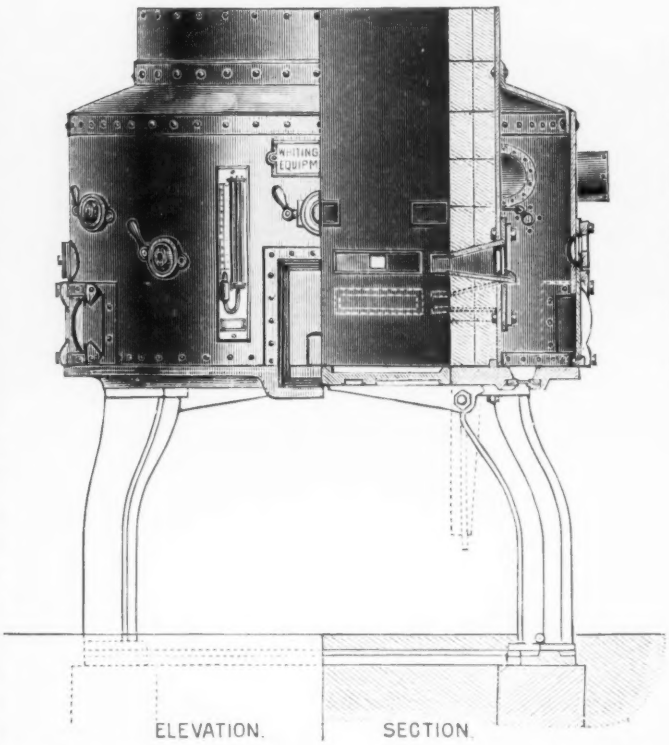
The Center Blast Cupola

IS STILL ON TOP!

The Foundry Outfitting Co.

DETROIT, MICH.

COMPLETE
FOUNDRY EQUIPMENT



Ladles

Trucks

Elevators

Tumblers

Sand Sifters

Turn Tables

The Whiting Cupola.

ADOPTED by over three hundred high-class Foundries. Unexcelled for fuel economy and all-round efficiency. A rapid melter. Saves lining. Gives hot iron. No experiment—an established success. Fourteen sizes. Send for circulars and our new prices. A good time to buy.

IMPROVED

Air Hoists and Cranes.

"TYPE A" Hoist, for Foundry use, has an adjustable speed valve. The load may be held under pressure in any position. Patent exhaust attachment. Safety check. All sizes. Send for prices and circulars.

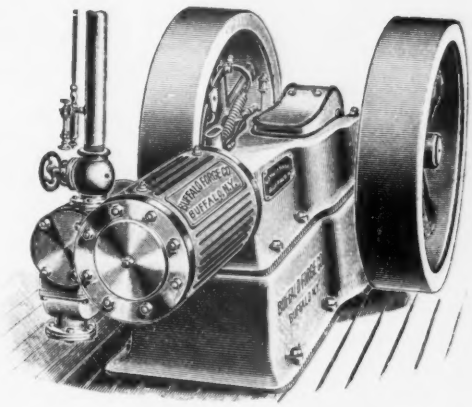
Whiting Foundry Equipment Co.

WORKS: Harvey, Ill. CHICAGO OFFICE: 1522 Monadnock Block.

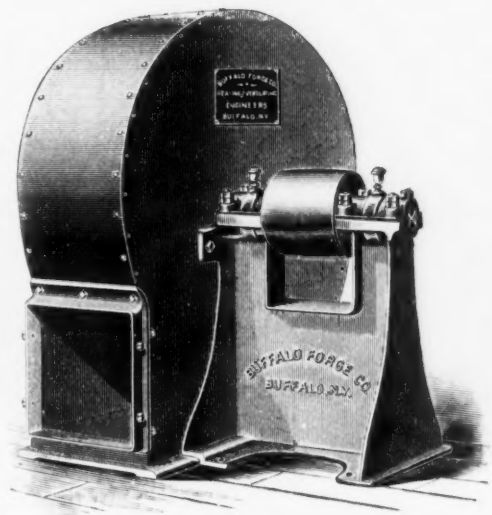
CUPOLA BLOWER.

For the latest development in Cupola Blower construction and application, see BUFFALO FORGE CO.'S 1896 Sectional Catalogue, "America's Best, the World's Standard."

BUFFALO FORGE CO.'S Automatic Cut-off Engine, Horizontal and Upright types for Electric Lighting and Power purposes, direct connected or belted. 1896 Sectional Catalogue furnishes full details.



CLASS "A" HORIZONTAL.

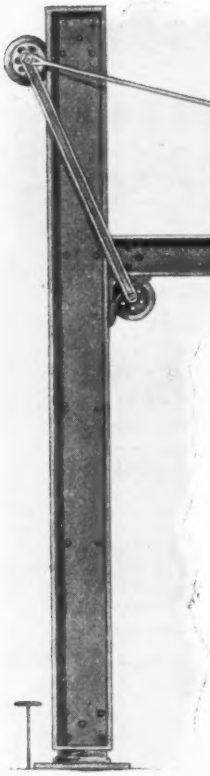


TUMBLING BARREL EXHAUSTER.

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment. Send for details.

BUFFALO FORGE CO.,
BUFFALO, N. Y., U. S. A.

CHICAGO, 22-24 W. Randolph St. NEW YORK, 26 Cortlandt St.



DO YOU NEED **CRANES?**

WE MAKE CRANES

. . . . ASK FOR OUR PRICES ON CRANES

With our special tools we make **Flange Pipe** at low cost. Let us name you prices when you require . . . .

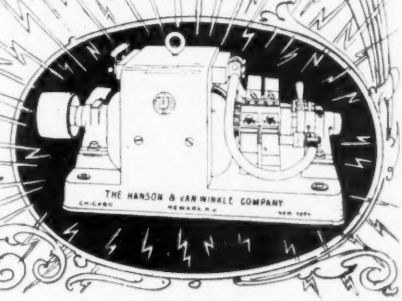
HUB OR FLANGE PIPE AND FITTINGS.

We may be able to supply them to you at less than your cost. . . . . .

The Addyston Pipe and Steel Co.

CINCINNATI, OHIO.

NICKEL-PLATING OUTFITS



THE
HANSON & VAN WINKLE
COMPANY.
NEWARK, N.J.
CHICAGO. NEW YORK.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page - -	per month, $20.00
Half page - - -	" 12.00
Quarter page - -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

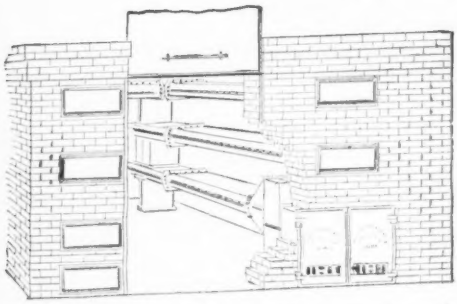
The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates thus giving it to all alike, and no reduction of any sort on the above rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

BROWN & SHARPE MFG. CO.

PROVIDENCE, R. I.

CASTINGS FOR CORE OVENS.



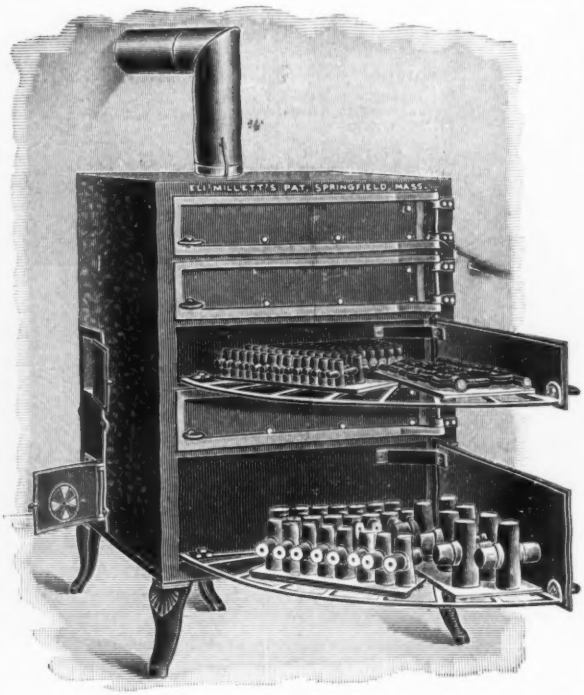
The cut shows the general arrangement of a core oven that is economical and convenient to use, and that has been in successful use in our foundry for several years.

The distinctive feature of this core oven is an enclosed fire box, or stove, connected with the chimney by a series of cast iron flues of rectangular section. These flues run inside the oven, back and forth, in several tiers along the sides and across the end, evenly distributing the heat and keeping the oven free from ashes, smoke and gases.

The flues form shelves suitable for drying cores and their arrangement leaves the body of the oven free to receive a car or truck upon which shelves can be placed, making the oven suitable for large or small work.

The stoves are designed for the economical combustion of coal and can be placed to open on the right or left of door or on either side of the oven.

The patterns for the flues are so made that they can be adapted to various forms and sizes of ovens.



Millett's Patent Core Oven

THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

Over one hundred and fifty in use.

SEND FOR OUR NEW CATALOGUE GIVING NAMES OF THOSE USING THEM.

Millett Core Oven Co.

BRIGHTWOOD, MASS.

For Sale by J. W. PAXSON & CO. Philadelphia, Pa.

BUYERS' DIRECTORY.

ALUMINUM.
Cowles Electric Smelting & Aluminum Co., Lockport, N. Y.

AIR HOISTS.
Whiting Foundry Equipment Co., Harvey, Ill.

BARROWS, TRUCKS, ETC.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Lansing Wheelbarrow Co., Lansing, Mich.
Syracuse Chilled Plow Co.

BLOWERS.
Buffalo Forge Co., Buffalo. N. Y.
Connersville Blower Co., Connersville, Ind.
Garden City Fan Co. Chicago, Ills.
Root, P. H. & F. M. Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass
Wilbraham Baker Blower Co., Philadelphia, Pa.

BRONZES.
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

CHARCOAL.
Springfield Facing Co., Springfield, Mass.

COKE.
Washington Coal and Coke Co., 7 Wood St., Pittsburg, Pa.

CORE COMPOUNDS.
American Glutrose Works, Philadelphia, Pa.
Stewart, W. H., 182 Front St., New York.
Vreeland Tompkins, Jersey City, N. J.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
Lansing Wheelbarrow Co., Lansing, Mich.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Foundry Outfitting Co., Detroit Mich.
Whiting Foundry Equipment Co., Chicago.

CRANES.
Addyston Pipe and Steel Co., Cincinnati, O.
Craig Ridgway & Sons, Coatesville, Pa.
Harrington, E., Sons & Co., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Shaw Electric Crane Co.
Wm. Sellers Co.
Whiting Foundry Equipment Co., Harvey, Ill.

CRUCIBLES.
Joseph Dixon Crucible Co., Jersey City, N.J.
McCullough-Dalzell Co, Pittsburg, Pa.
Taylor Crucible Co., Robt. J., Philadelphia, Pa.

CUPOLAS.
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

FIRE-BRICK.
Brooklyn Fire Brick Works, Brooklyn, N. Y.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.

FLEXIBLE SHAFTS.
Stow Flexible Shaft Co., Binghamton, N. Y.
Chicago Flexible Shaft Co., Chicago, Ill.

FOUNDRY LADLES.
Foundry Outfitting Co., The, Detroit.
Obermayer Company, The S., Cincinnati, Ohio.
Paxson & Co., J. W., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whiting Foundry Equipment Co., Harvey, Ills

FOUNDRY PLANS.
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ills

FOUNDRY SUPPLIES.
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Foundry Outfitting Co., The, Detroit, Mich.
Joseph Dixon Crucible Co. Jersey City, N J.
J. S. McCormick Company.
Garden City Sand Co., Chicago, Ill.
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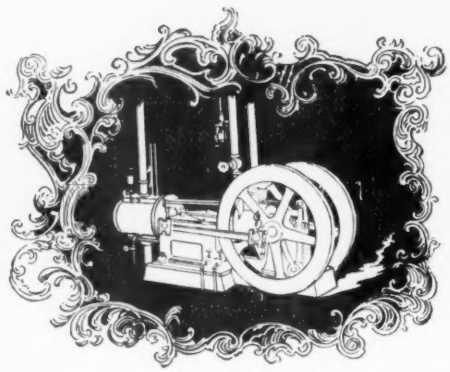

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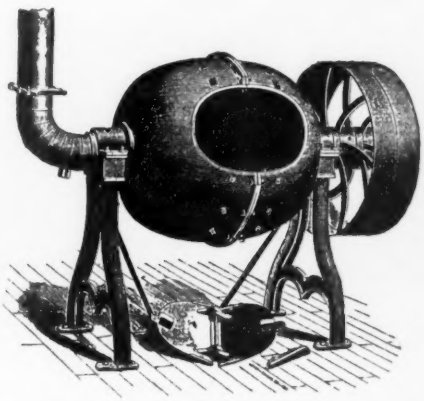

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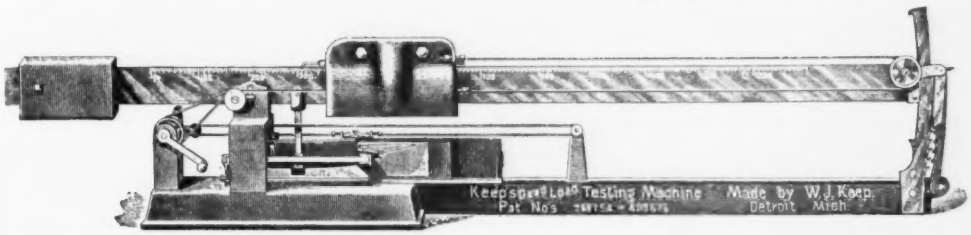

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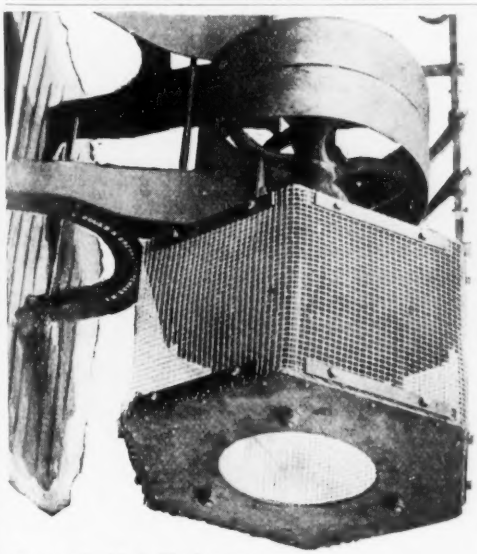

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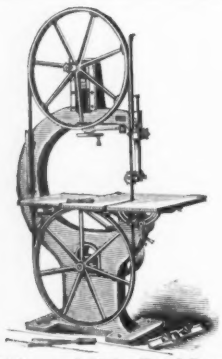

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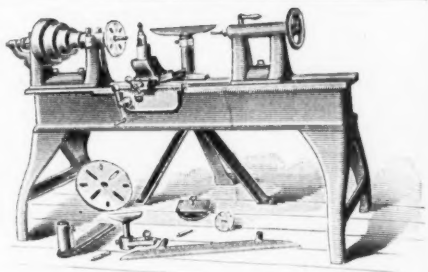

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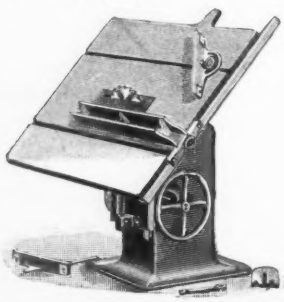

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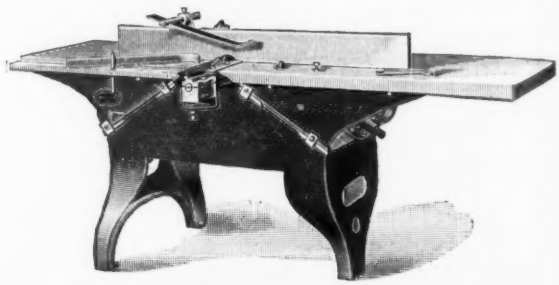

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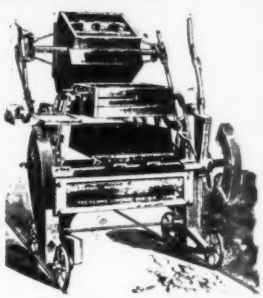

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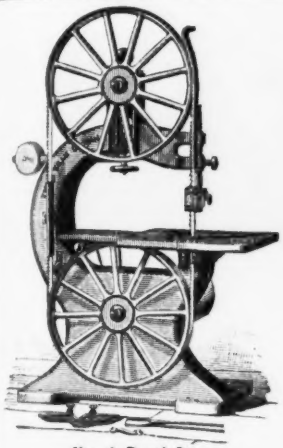

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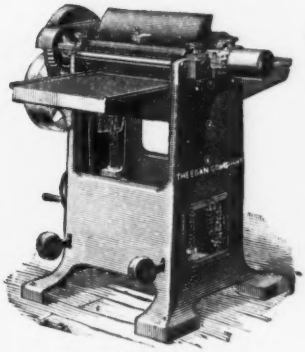

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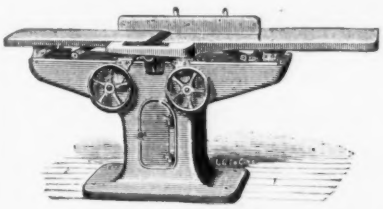

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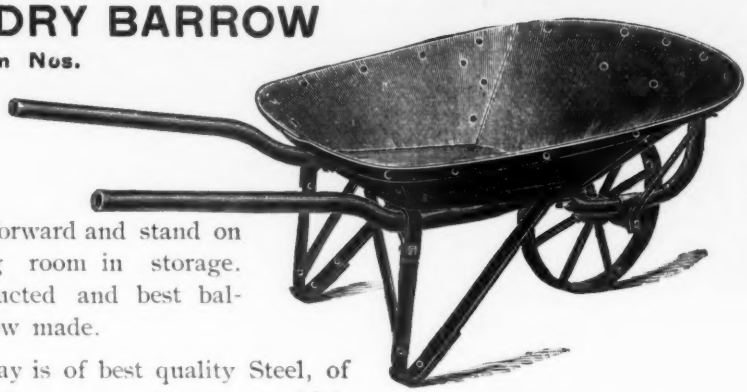

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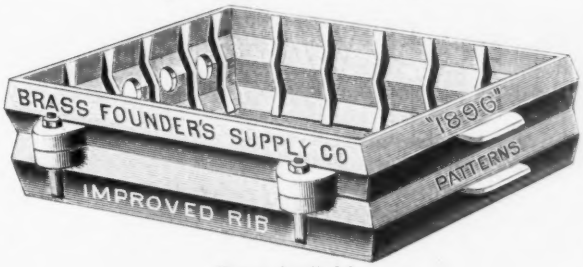

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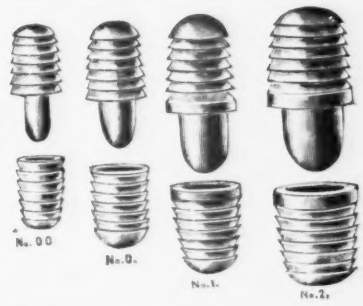

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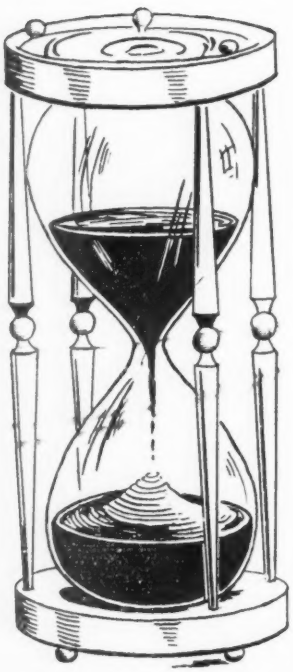

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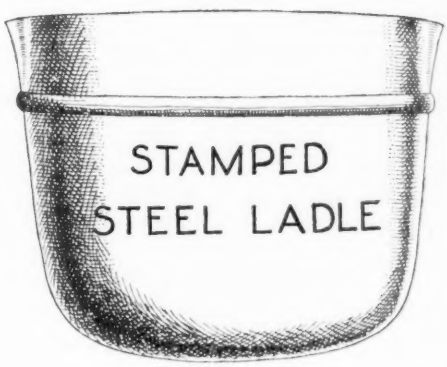

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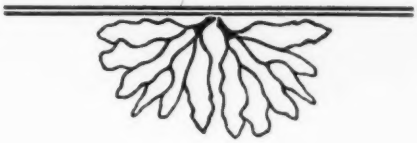

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CENTRE ISLAND, L. I.
WATERFORD, N. Y.
ALBANY, N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

TRY OUR CRUCIBLES
THEY GIVE SATISFACTION
McCULLOUGH DALZELL COMPANY.
36 ST. & A.V. RY. PITTSBURG PA.

"Just as Good!"

WE Are constantly hearing from our customers that they are being offered an article "Just as Good" as our . . .

C. F. M. PERFECT WASH . .

If the user has ever used our **C. F. M.** he soon finds that he has been deceived when buying any other. If he has not used the **C. F. M.,** he should write for a free sample immediately.

Can be used Wet or Dry.

Can be applied with Brush, Hand or Bag.

C. F. M. PERFECT WASH is positively the best article on the market to insure that bright blue color on heavy castings. Works equally as well on Dry or Green Sand.

IF YOU HAVE ANY HEAVY WORK IN THE SHOP, WRITE FOR SAMPLE . . . .

Cleveland Facing Mills Co. CLEVELAND, OHIO.

G. P. M. Founders' Perfect Wash.
G. P. M. Ingot Wash.

Lubricating Plumbago.
India Silver Lead.

Geo. P. Millns Foundry Facing Co.

. . . Makers and Importers of . . .

Foundry Facings, Supplies and Plumbago.

Hamilton and C. & P. R. R.
Telephone 2761.

Cleveland. O., Nov. 16, 1896.

To Foundrymen Everywhere:

Gentlemen—We beg to advise that we have opened a warehouse at the junction of Hamilton St. and C. & P. R. R., and will carry in stock a full line of Fouudry Facings and Supplies. We shall also manufacture the "G. P. M. Founders' Perfect Wash," originally invented by our Mr. Geo. P. Millns. This "Wash" is what its name implies, "perfect." A trial will convince you of its merits. Great care has been taken in the purchase of Plumbago or India Silver Lead which we import from East India, and which we can furnish at prices equal to any. Mr. Millins, who has had seventeen years practical experience in the Facing line, twelve years of which were as General Manager of a Mill in this city, will give the entire business his personal supervision. His long experience qualifies him to turn out as good material as can be bought.

He desires to express to the trade his appreciation of past favors, and will endeavor to merit your future business by supplying your wants with material that is second to none.

Desiring your commands, we are,

Very respectfully yours,

Geo. P. Millns Foundry Facing Co.

Crucible.

ROBT. J. TAYLOR & SON

Crucible

Dipper.

Cover.

Stopper.

Crucibles

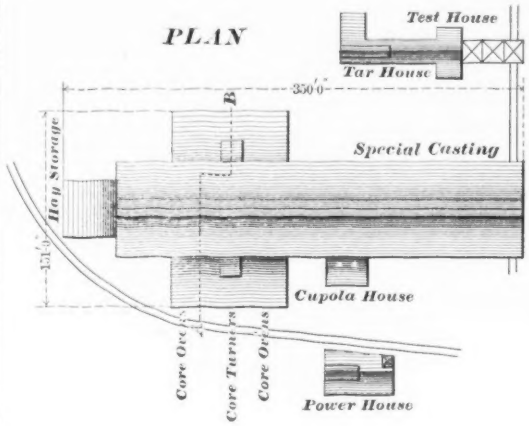
For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; Small Crucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

We make All Sizes, from 8 oz. to 2 ton Capacity.

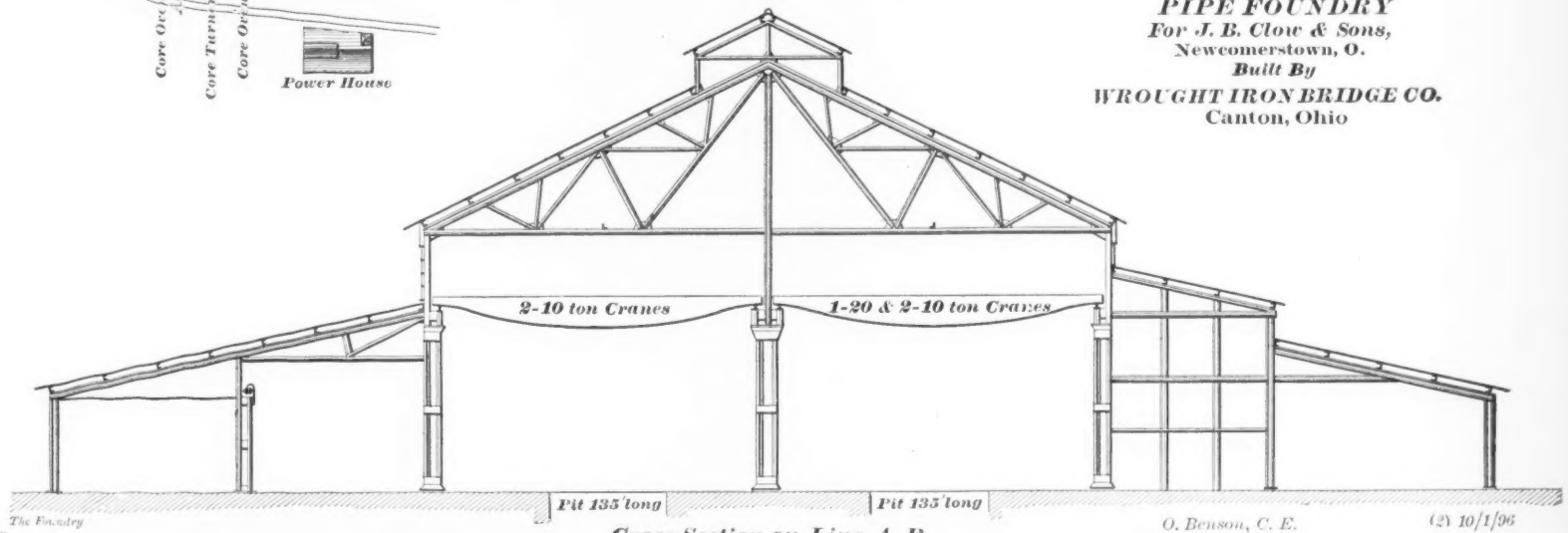
ROBT. J. TAYLOR & SON,

1900 to 1916
CALLOW HILL STREET, PHILADELPHIA, PA.



WROUGHT IRON BRIDGE CO.

PIPE FOUNDRY
For J. B. Clow & Sons,
Newcomerstown, O.
Built By
WROUGHT IRON BRIDGE CO.
Canton, Ohio



The Foundry

Cross Section on Line A-B

O. Benson, C. E.
Structural Engineer

(2) 10/1/96

We design and construct Foundries, Machine Shops and similar structures. Also Roofs, Turntables and Bridges of every description.

Principal Office and Works at Canton, O.
Branch Offices at New York, Chicago, Indianapolis and Kansas City.

CHAS. M. JARVIS, President and Chief Engineer.
GEO. H. SAGE, Secretary

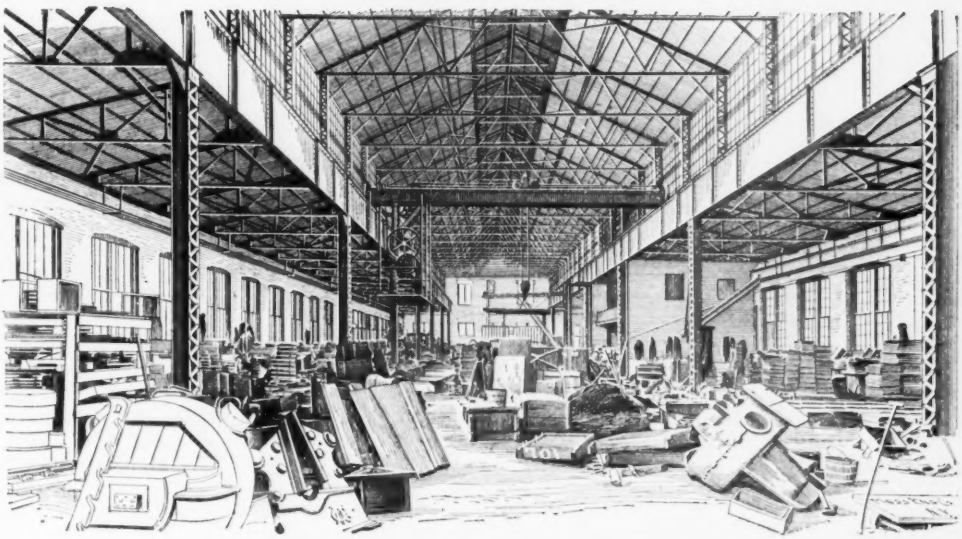
BURR K. FIELD, Vice-President.
F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

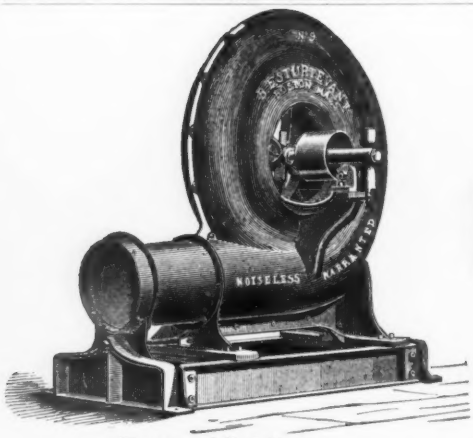
Iron and Steel Bridges, Roofs and Buildings.



The above illustration is an interior view and shows a foundry building designed and built by us for the Pratt & Cady Co., at Hartford, Conn. The central portion is 35 feet in width, with a 15 ton crane, having a travel the full length of the building. Each wing is 20 feet in width and the entire building is 225 feet in length, constructed entirely of brick, iron, and glass, no wood work being used about the building in any way, except in the window sash and casings. The building is absolutely fire-proof.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

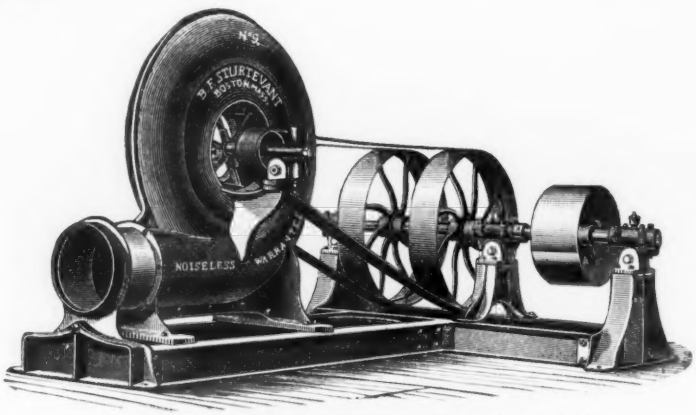
—FOR—

Cupola Furnaces and Forge Fires.

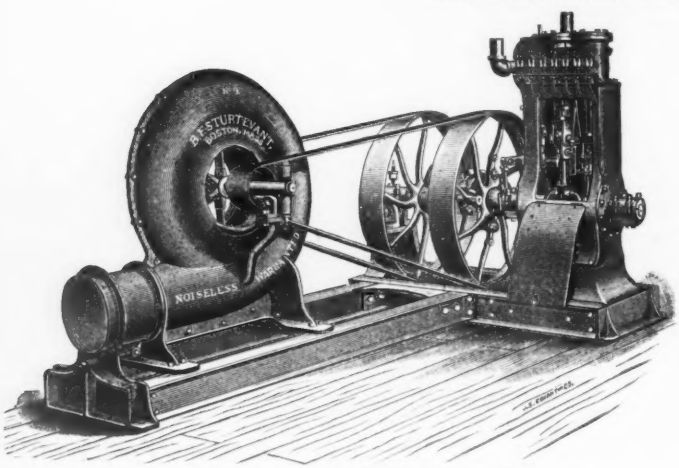
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

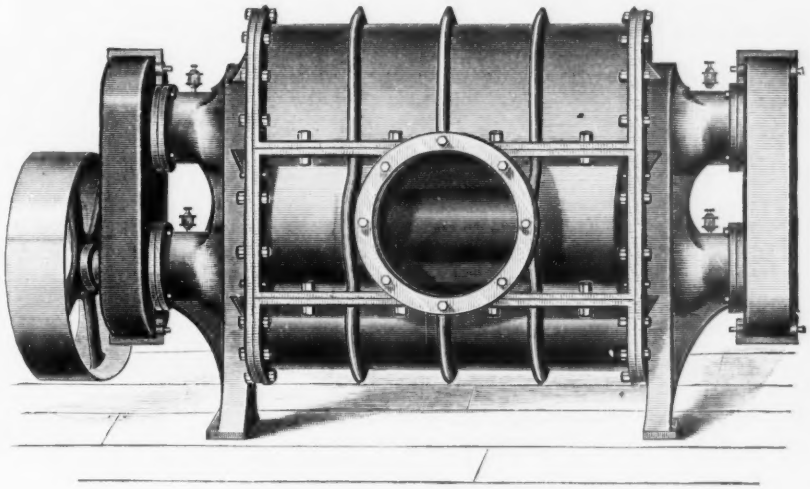
BOSTON, MASS.

131 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Green Rotary Pressure Blower

GIVES THE MOST AIR FOR A $.



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

GIVES THE MOST AIR FOR A $.

SEND FOR CATALOGUE.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

P.C.COCHRAN. President
JNO.H.WURTZ. Secretary
J.R.LAUGHREY. Treasurer
J.S.NEWMYER. Manager
COAL MINES & COKE WORKS
On Pittsburg & Lake Erie Railroad.
GENERAL OFFICE
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Pittsburg Pa
WASHINGTON COAL & COKE CO.
CAPITAL PAID UP $250,000.00
Youghiogheny Coal · High Grade Coke
INDIVIDUAL CARS.
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DIRECTORY OF LEADING PIG IRON DEALERS.

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

HENRY H. ADAMS & CO.

(Incorporated)

PIG IRON

Sole Agents for the Celebrated "NORWAY," for combined Strength and Softness.

177 Broadway,
NEW YORK CITY, N. Y.

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,
Philadelphia.

THE DOMHOFF & JOYCE CO.

PIG IRON COMMISSION,

CINCINNATI.

CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

THE MARSHALL IRON

An old fashioned Pennsylvania Iron for high grade machinery.

The Juniata Furnace & Foundry Co.

Beach & Marlborough Sts.,

C. T. Holbrook, Sole Agent. PHILADELPHIA.

MILLER, WAGONER & BENTLEY,

PIG IRON.

Steel, Ore, Coke and Cinder.

Long Distance Telephone No. 842. COLUMBUS, OHIO.

PICKANDS, BROWN & CO.,

Manufacturers, Importers and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO,

BUFFALO,

PHILADELPHIA, NEW YORK,

ST. LOUIS

A Good Thing is Always Appreciated!

Our design captured the order of the CHATTANOOGA FOUNDRY & PIPE WORKS, Chattanooga, Tenn. for . . . . . .

EIGHT ELECTRIC SWING CRANES

FOR THEIR PIPE FOUNDRY

If you have not investigated the merits of our Cranes, it will pay you to do so before placing orders.

The Phœnix Iron Works Co.,

WASON STREET, CLEVELAND, O.

Builders of Modern Cranes.

EASTERN OFFICE, H. W. JENNINGS, AGENT, FULTON AND CLIFF STS., NEW YORK.

NEW ENGLAND OFFICE, THE JOHN WALES CO. BOSTON, MASS.

CORRESPONDENCE SOLICITED.

MENTION THE FOUNDRY.

Over 10,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries

In addition to 400 Railroads and over 300 Contractors.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.

EDWARD ROBINSON, Sole Proprietor.

MENTION THE FOUNDRY.

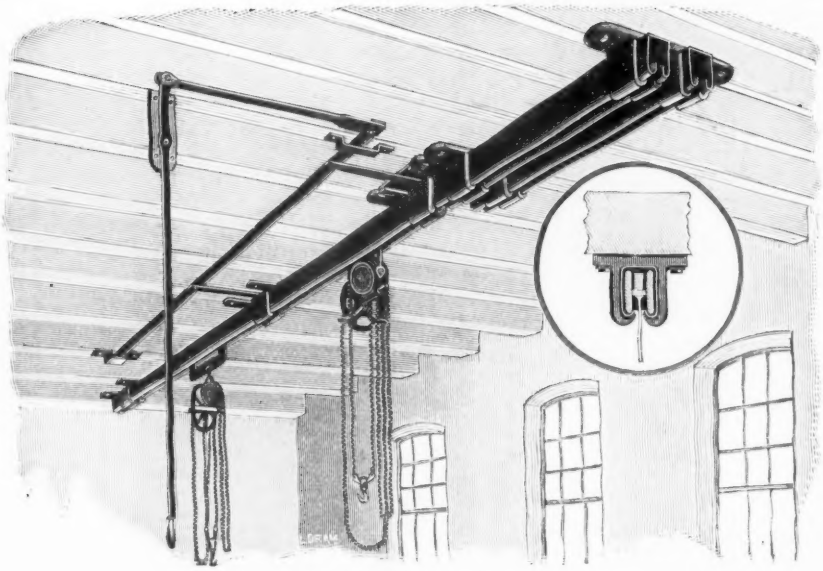
44-46 WASHINGTON STREET, NEW YORK.

ROSS-MEEHAN FOUNDRY CO.,
CHATTANOOGA, TENN., May 5, '96.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonia's, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensible to us.

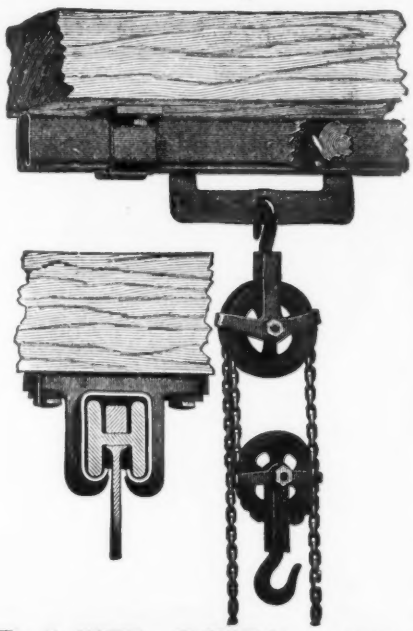
Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.



THE PATENT

Overhead Trolley Track System

Is the coming improvement in the iron foundries of this country and in many cases can be made to pay for itself in a few months.



Just the thing for

Carrying Iron from Cupola to Floors.
Carrying Castings from Floors to Cleaning Rooms. . . . .
Lifting, Rolling or Moving Flasks. .

All who have adopted this system have expressed themselves as being delighted with it.

Write us for Circulars, Estimates and Full Particulars.

COBURN TROLLEY TRACK MFG. CO.

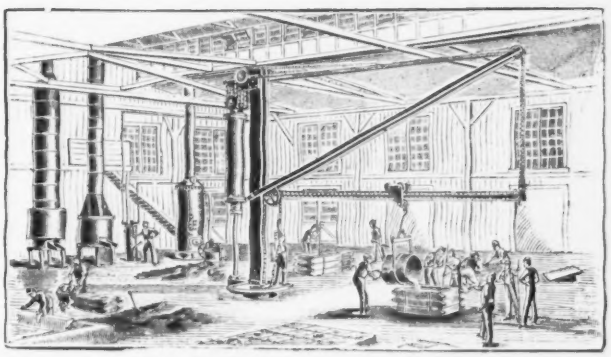
HOLYOKE, MASS.

"What is Charity?"

Helping the unfortunate brother out of the ditch; that is "CHARITY," my boy.

And that is what the Ridgway Balanced Steam-Hydraulic Crane has done for many and many a fellow. That is why it is as popular as the Good Samaritan.

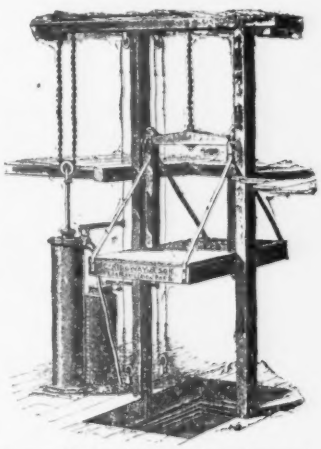
The poor Foundryman was having a sorry enough time of it. Things were not going right in the shop. The place was all cluttered up with flasks and stuff. The men were harum scarum and careless. The work didn't come out in good shape. Lots of bad and scabby castings. Too many laborers were required. Everything seemed slow and wasteful. The men were like the shop, and the anxious, bedraggled foundryman had the "horrors," and was certainly in the ditch on the Jericho road.



5-ton Steam-Hydraulic Crane in a Foundry.

Along came the big-hearted Ridgway Crane, always on the lookout for just such as he, and what a transformation there was in that shop. The place was soon cleaned up and things began to hum. No more scabby castings. Day laborers cut in two. The Ridgway Crane set the pace, and the men soon got to working like the crane. Quickly, Silently, Perfectly. The dollars began to jingle in the office and the foundryman began to smile. Ah, how he loves the Ridgway Crane! Just ask him about it.

Now, we have hard times, and have 'em right, too. In times when everything is dark and gloomy, the Ridgway Crane, like our old friend Mark Tapley, "comes out strong." Many is the fellow who feels like saying "Amen" to that.



Steam-Hydraulic Elevator, also mad direct acting with cylinder under platform.

Never was there such a charitable machine as the Ridgway Crane. Scattering benefits wherever men have welcomed it. Relieving expensive men from exhaustive work. Keeping shops and mills a going, and even making some money in times when money is particularly hard to make.

Charity! Helpfulness! Name the equal of this crane if you can.

Faith, Hope, Charity, these three, and the Ridgway Crane is all three of them if you will have it

"PLEASE TAKE THE ELEVATOR."

Swell Hotels, Department Stores, Big Office Buildings, etc., need not apply.
This is a select machine, only for Iron works and Foundries.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

SHERRY TORCH

MORE

SIMPLE!
EFFICIENT!
PORTABLE!
RELIABLE!
EASILY OPERATED!
AND CHEAPER!

100 TO 4,000 CANDLE POWER,

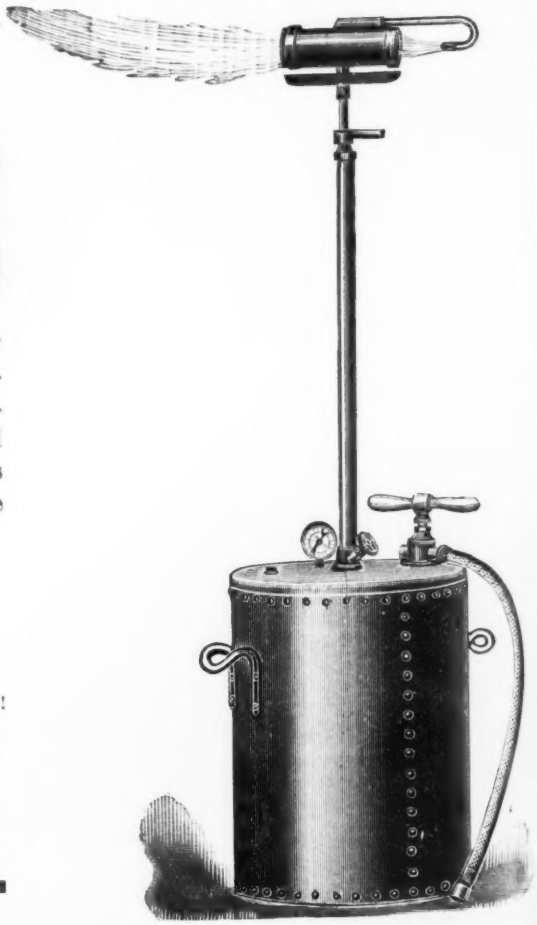
GIVING A CLEAR, WHITE LIGHT.

Indispensible in all places where a Powerful and Portable Light is required.

..FOR..

FOUNDRIES

Boiler Makers, Bridge and Girder Works, Rolling Mills, Forges, Contractors and Builders, Stone Quarries, Ship Yards, Dry Docks, Coal Wharves, Harbor Works, Saw Mills Dredgers, Street Railways, Bridge Building.



Requires No Skilled Labor!
Unaffected by Wind or Rain!
Can be Started in a Few Minutes!

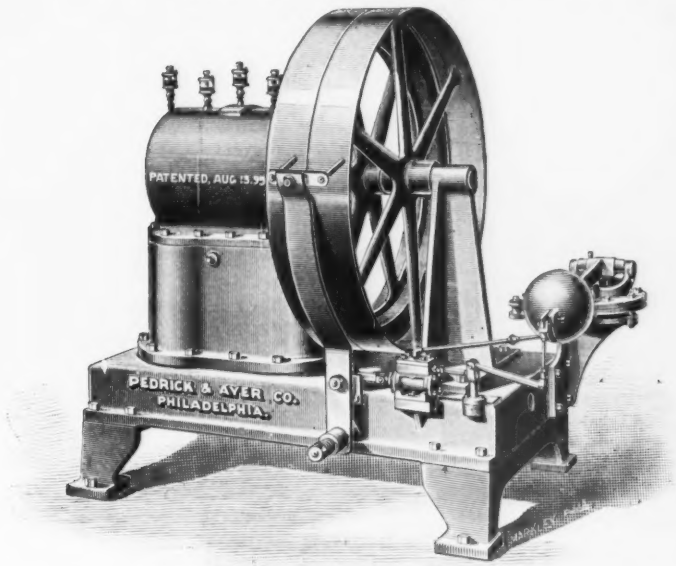
For TERMS and PRICES, Address

Sherry Torch Co.

ROCHESTER, N.Y.

Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.



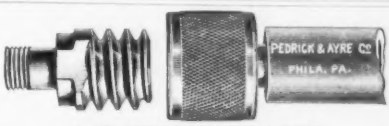
Straight Lift Hoist.

Built in two sizes, Nos. 1 and 2.

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11x 6 6x 6	100-160	32- 50	2-3½	40x4½	2875 lbs.	60x40	Parian
2	15x10 8x10	90-120	90-120	5-7	60x6	5370 lbs.	76x60	Parish

HORIZONTAL HOIST.

PAT. SEPT 4TH 1894



AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

PEDRICK & AYER CO.

SPRING GARDEN STATION, PHILADELPHIA, PA.

FOUNDRY CRANES

These Cranes are constructed upon thoroughly practical principles. Every detail has been carefully studied and improvements have been added to increase efficiency and economize cost of operation of both **Jib and Traveling Cranes.**

CENTRIFUGAL SAND MIXER!

A new, simple and practical method of **preparing Sand for Molds or Cores,** superseding the old time methods of drying and riddling. Damp Sand is in just the proper condition for working.

The saving in labor alone soon repays the cost of the apparatus.

The Capacity depends entirely upon the facilities for feeding sand into the hopper, this may exceed 10 tons an hour. Two men will easily shovel 5 tons an hour by hand into the machine. One handling is, in ordinary work, all that is requisite.

A FEW USERS.

Farrel Foundry & Mach. Co.
Ansonia, Conn.

Westinghouse Air Brake Co.,
Wilmerding, Pa.

I. P. Morris & Co.,
Phila., Pa.

McConway & Torley Co.,
Pittsburgh, Pa.

Deane Steam Pump Co.,
Holyoke, Mass.

Erie Malleable Iron Co.,
Erie, Pa.

E. Chicago Foundry Co.,
E. Chicago, Ind.

Maher & Flockhart,
Newark, N. J.

Murray Iron Works Company,
Burlington, Iowa.

Newport News Iron and Brass Works,
Newport News, Va.

William Sellers & Co., Incorp.

PHILADELPHIA.

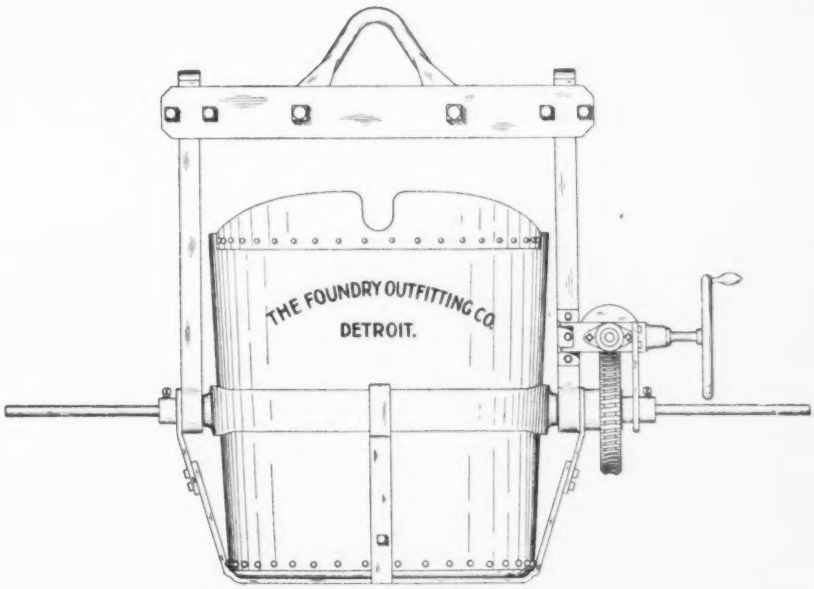
Cupola Furnaces
Blowers
Cranes
Compressors
Hoists
Elevators
Foundry and
Core Oven Cars
Ladles
Reservoirs

Ladles

These are not for making gold or silver dollars, but to pour the stuff that will make **IRON CASTINGS,** which you can turn into either of the above.

We can furnish promptly any size from a

HAND LADLE TO 20-TON CAPACITY



Tumbling Mills
Core Ovens
Sand Sifters
Brass Furnaces
Testing Machines
Trolley Tracks
Foundry Lights
Flasks
Fire Brick
Fire Clay
Molding Sand

THIS IS ONE OF OUR LATEST

GEARED LADLES

HOW DO YOU LIKE IT?

We have Everything Used in a Foundry.

WRITE

The Foundry Outfitting Co.

DETROIT, MICH.

LADLES TRUCKS

AIR HOISTS

You have doubtless been interested in the recent papers on this subject read before various Foundrymen's Associations. We would be glad to interest you in the prices of these appliances.

AIR CRANES

(ALL KINDS OF CRANES—ALL SIZES.)

Incidentally we may remind you that we are building **Whiting Cupolas** right along. We are making three big ones now for the U. S. Navy Yard at Washington. Uncle Sam knows a good cupola when he sees it.

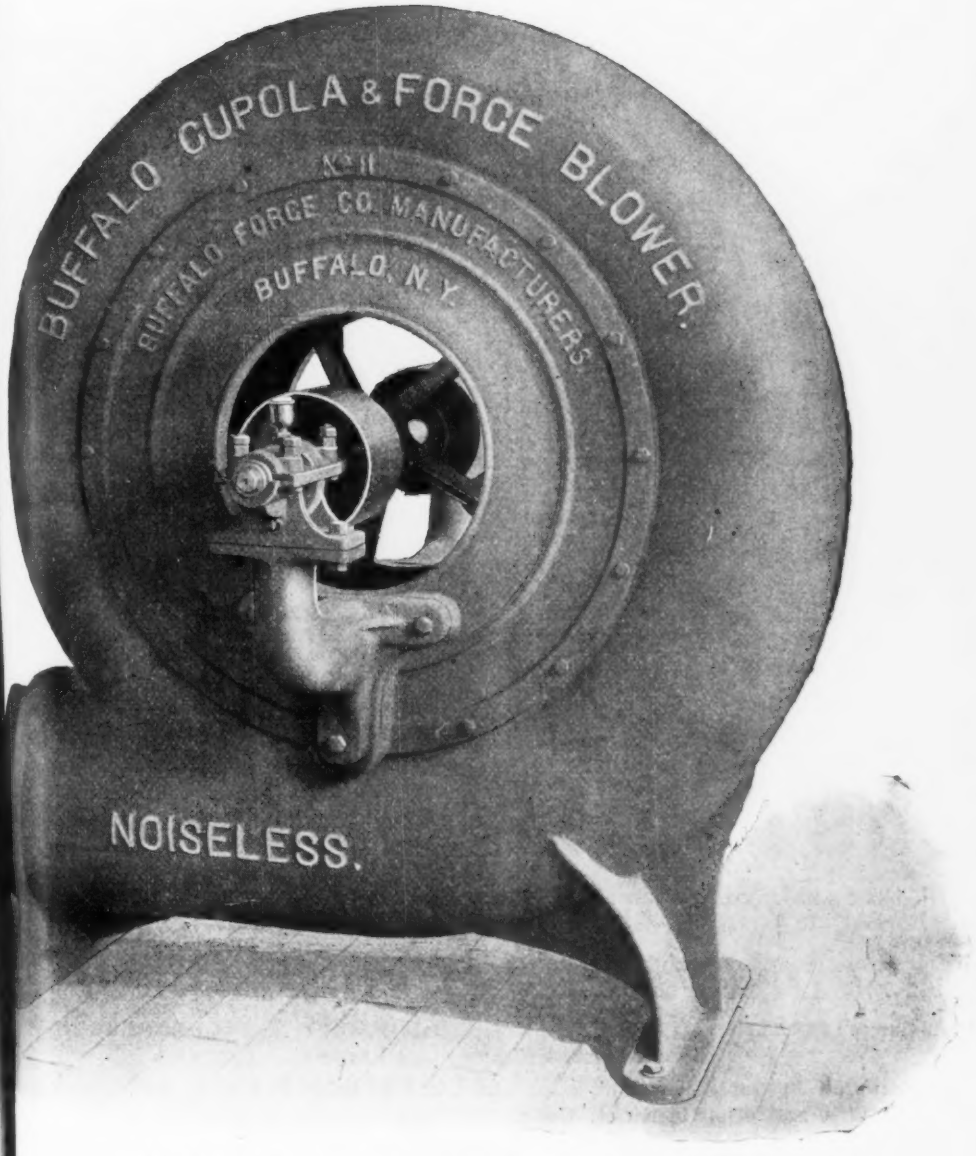
SEND FOR CIRCULARS.

Whiting Foundry Equipment Co.

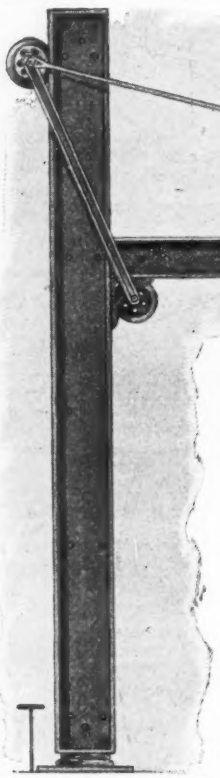
Address Works:
HARVEY, ILL.

CHICAGO OFFICE:
1522 Monadnock Block.

TUMBLERS TURNTABLES



Furnished with Combined Adjustable Bed and Countershaft where desired.



DO YOU NEED **CRANES?**

WE MAKE CRANES

. . . . ASK FOR OUR PRICES ON CRANES

With our special tools we make **Flange Pipe** at low cost. Let us name you prices when you require . . . .

HUB OR FLANGE PIPE AND FITTINGS.

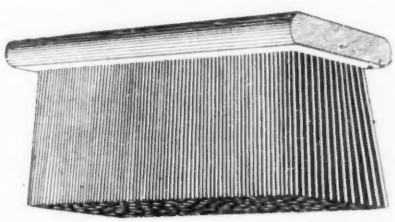
We may be able to supply them to you at less than your cost. . . . . .

The Addyston Pipe and Steel Co.

CINCINNATI, OHIO.

DON'T YOU WANT

CLEAN CASTINGS?



Well then, ask your Dealer for the "BUCHEL MACHINE-SET" Steel Wire Brushes, and Take no Other.

Low in Price. High in Quality.

A distinctly **MODERN ARTICLE,** combining **SIMPLICITY** and **CHEAPNESS,** with **Convenience, Efficiency** and **Elegance.**

Backs all in One Piece—can't come apart, and **rounded** to suit the **hand,** a feature **never found in any other brush on the market.**

GOOD MATERIAL. SUPERIOR WORKMANSHIP.

REMEMBER! **All Machine Made** and the only **Machine Made** on the market, therefore **they are uniform.** . . . .

Your dealer keeps them, but if not, then write us for particulars and mention The Foundry.

YOURS FOR BUSINESS,

THE BUCHEL BRUSH CO., New Orleans, La.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page - -	per month, $20.00
Half page - - -	" 12.00
Quarter page - -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

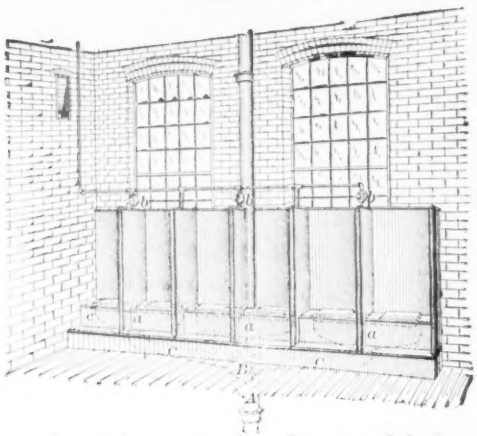
The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates thus giving it to all alike, and no reduction of any sort on the above rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

BROWN & SHARPE MFG. CO.

PROVIDENCE, R. I.

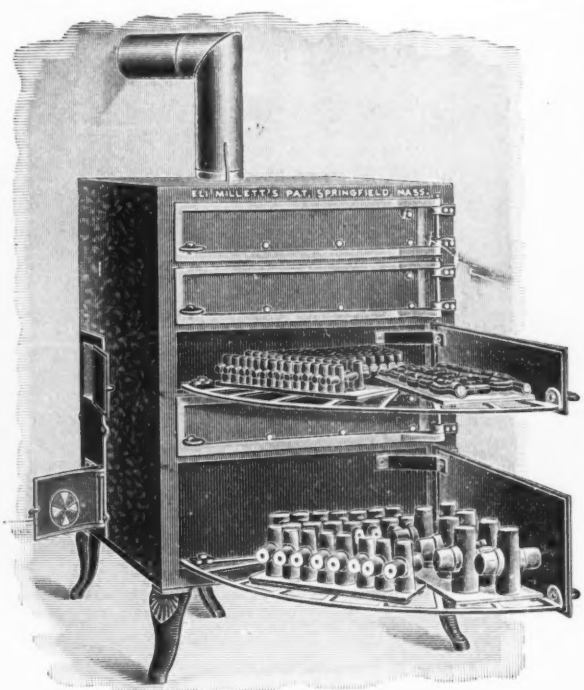
SANITARY



CLOSETS

Very little danger of getting out of order or of being obstructed by waste or other substances.

Comparatively little water is required, and the total cost for repairs in our works has averaged less than one dollar a year.



Millett's Patent Core Oven

THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

Over one hundred and fifty in use.

SEND FOR OUR NEW CATALOGUE GIVING NAMES OF THOSE USING THEM.

Millett Core Oven Co.

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For Sale by J. W. PAXSON & CO. Philadelphia, Pa.

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AIR HOISTS.
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Syracuse Chilled Plow Co.

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Buffalo Forge Co., Buffalo. N. Y.
Connersville Blower Co., Connersville, Ind.
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Root, P. H. & F. M. Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass
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Springfield Facing Co., Springfield, Mass.

COKE.
Washington Coal and Coke Co., 7 Wood St., Pittsburg, Pa.

CORE COMPOUNDS.
American Glutrose Works, Philadelphia, Pa.
Vreeland Tompkins, Jersey City, N. J.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
Foundry Outfitting Co., Detroit Mich.
Whiting Foundry Equipment Co., Chicago.

CRANES.
Addyston Pipe and Steel Co., Cincinnati, O.
Craig Ridgway & Sons, Coatesville, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Shaw Electric Crane Co.
Wm. Sellers Co.
Whiting Foundry Equipment Co., Harvey, Ill.

CRUCIBLES.
Joseph Dixon Crucible Co., Jersey City, N.J.
Hussman Crucible Co., St. Louis, Mo.
McCullough-Dalzell Co, Pittsburg, Pa.
Taylor Crucible Co., Robt. J., Philadelphia, Pa.

CUPOLAS.
Foundry Outfitting Co., The, Detroit, Mich.
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Millns Facing, Co. Geo. P.
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Joseph Dixon Crucible Co. Jersey City, N J.
J. S. McCormick Company.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson & Co., J. W., Philadelphia, Pa.
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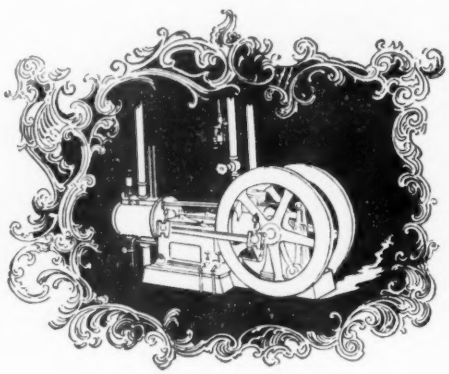
If you don't you are not keeping up with the times.

AIR IN THE SHOP SAVES MONEY.

THE

Ingersoll-Sergeant Drill Co.

Havemeyer Building,
New York.



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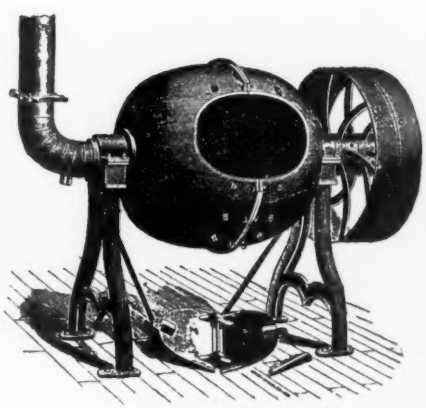
Air Compressors OF THE Ingersoll-Sergeant Make,

ARE THE HIGHEST TYPE OF MACHINES.

STOVER'S IMPROVED

EXHAUST TUMBLING BARREL



The Stover Egg Shaped Barrel does double the work of any other with less noise and power.

It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

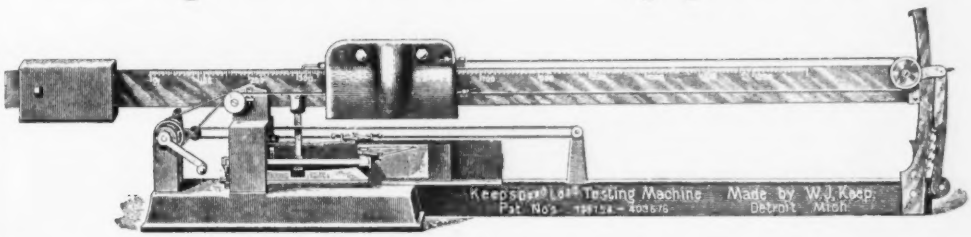
For full particulars, address,

Stover Manufacturing Co.

205 RIVER STREET,

FREEPORT, ILL.

"Keep's Test" Apparatus.



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Mr. W. J. Keep, City:

DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

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H. M. LELAND, Vice-President.

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Eberhardt's Patented Sprue or Gate Cutter

Dear Sir:—The machine fills the bill; am just delighted with it.
Yours truly,
Maryland Brass & Metal Works,
Baltimore, Md.

Price Low

Send to

GOULD & EBERHARDT, NEWARK, N. J.

Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

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"CLINTON" AND "HECTOR"

INSPECTED FOUNDRY IRONS . . . . .

ALSO

Sole Factors for DUNBAR STRONG IRON

In New York and New England.

None but the Best Southern Irons Sold

FURNACES, PITTSBURGH.

NEW YORK OFFICE, No. 15 Cortlandt St.

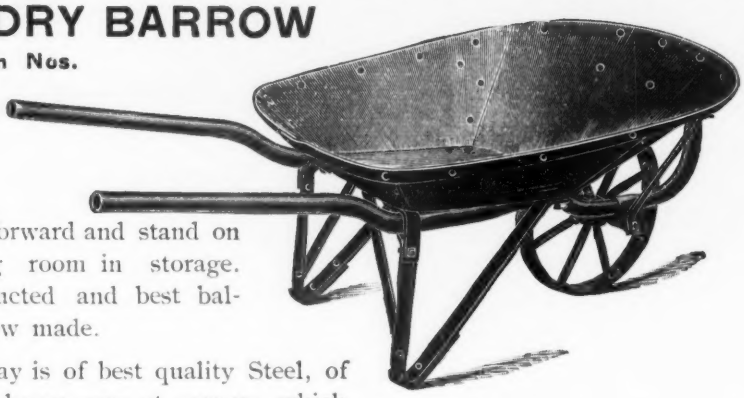
Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture.

DEAL WITH THE MANUFACTURER DIRECT.

"SYRACUSE" Steel Wheelbarrows

FOUNDRY BARROW

Ten Nos.



All dump forward and stand on end, saving room in storage. Best constructed and best balanced Barrow made.

The Tray is of best quality Steel, of uniform thickness save at corners, which are of double thickness, being smoothly lapped and riveted. The edges are rolled over a band of steel riveted under the flange. The Legs have renewable Steel Shoes. Patent Steel Wheel with Staggered Spokes. Heavily braced throughout. The most durable and easily handled Barrow made. Steel Charging and other Barrows in variety. Send for handsome Illustrated Barrow and Truck Catalogue No. 6—just out—to

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CHARCOAL

FOR FIRES.

CAR LOTS DELIVERED TO ALL PARTS OF THE U.S.

OUR CHARCOAL FACING FOR

BRASS FOUNDRIES

IS UNLIKE ANY OTHER.

IT WILL PAY YOU TO KNOW ABOUT IT.

SPRINGFIELD FACING CO.

SPRINGFIELD, MASS.

ESTABLISHED 1854.

Brooklyn Fire Brick Works

CUPOLA BLOCKS, FIRE SAND, FIRE CLAY, FIRE MORTAR, KAOLIN

AND ALL FIRE MATERIAL REQUIRED FOR FOUNDRY PURPOSES.

Send for Illustrated Catalogue and Prices.

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"Smooth On" Castings

"SMOOTH ON" IRON T COMPOUND CASTINGS

Will stop a hole steam tight or Repair a defect in Castings and often save 100 times its cost in time and money in repairing defects in Cast Iron Patterns or other Castings . . . . . .

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"Improvement the Order of the Age."

THREE NEW MODERS.

Smith Premier Typewriter

NOS. 2, 3 AND 4.

Have You Examined Them?

Many improvements heretofore overlooked by other manufacturers. Durability the first consideration. Address,

—THE—

Smith Premier Typewriter Co.

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(Trade Mark.)

The Universal Liquid Core Compound

Patented in the United States, England, France and Belgium.

GLUTROSE was invented and is manufactured by a practical foundryman of mary years' experience. It has been used in the Pennsylvania Railroad foundry at Altoona and other large foundries for the past three years with the most satisfactory results.

It is cheaper than any other compound in use, and never varies in quality.

Makes the most difficult cores for iron, steel or brass of any size.

The cores come out easily and leave the castings smooth.

Makes no offensive smell or smoke.

Will Never Blow the Castings.

AMERICAN GLUTROSE WORKS

Sole Manufacturers.

OFFICE: PENN MUTUAL BUILDING,

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ADVISES and Reports on

Foundry Practice and Equipment

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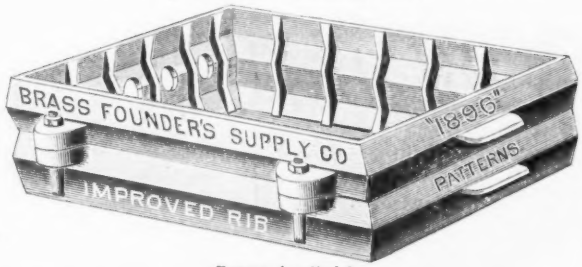
(Formerly R. M. BARNETT CO.)

Makers of

FLASKS
FURNACES
FOUNDRY

Supplies and Specialties.



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The Improved

RIB, BEVELED,

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Special Designs.

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Stronger and Cheaper than any others.

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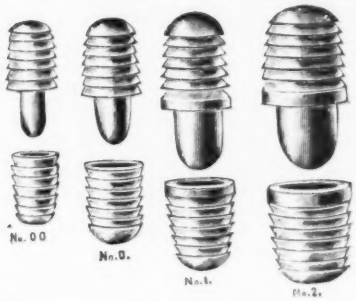
Brass Dowel Pin

FOR WOOD PATTERNS.



Put in the same way as the wood pins.
No trouble to the pattern maker.
It is used by all the leading houses.
Send for samples, hanger and price list.

DIAMOND CLAMP AND FLASK CO., RICHMOND, INDIANA.

FOUNDRY MOLDING MACHINES,
STRIPPING PLATE MACHINES,
PORTABLE, AIR-POWER, MACHINES,

USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.

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ELIZABETH, N. J.

ESTABLISHED 1875

STOW MANUF'G CO.,

BINGHAMTON, N. Y.

INVENTORS OF THE

FLEXIBLE SHAFT

FOR ALL PURPOSES.

The oldest and largest manufacturers in the world.

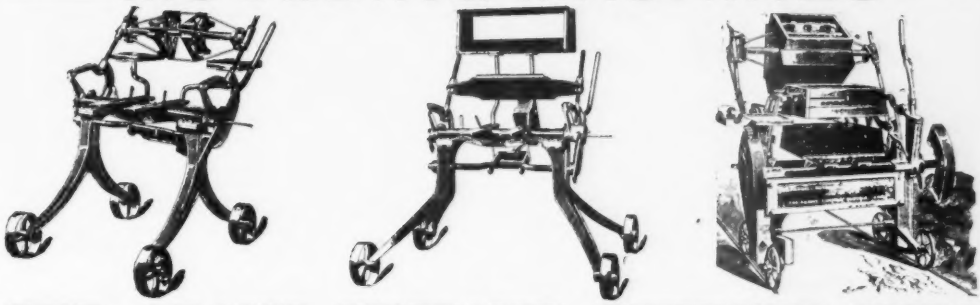
PORTABLE EMERY GRINDER

Take the tool to the work and save heavy handling.

WRITE US FOR CATALOGUE AND PRICES.

WE MOURN FOR THOSE WHO DO NOT KNOW
THE GOBEILLE PATTERN CO. CLEVELAND, O.

FARWELL'S MOULDING MACHINES Sendf Catalogue



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Jones—I say Smith, where can we buy the best Pattern Letters?

Smith—Why, we get ours of H. W. Knight & Son, Seneca Falls, N. Y., and we know their goods are all right.

J—Do they make Brass Letters for sweating on metal patterns?

S—To be sure, and the best we have seen, and you get prompt filling of orders too.

S—Thanks! I'll make a note of that and send them an order today.

FOUNDRY READERS, are you in need? Then follow Jones' example and be convinced.

"THE IRON FOUNDER" SUPPLEMENT

A COMPLETE ILLUSTRATED EXPOSITION OF

The Art of Casting in Iron.

COMPRISING THE

ERECTION AND MANAGEMENT OF CUPOLAS, REVERBERATORY FURNACES, BLOWERS, DAMS, LADLES, ETC.; MIXING CAST IRON; FOUNDING OF CHILLED CAR-WHEELS; MALLEABLE IRON CASTINGS; FOUNDRY EQUIPMENTS AND APPLIANCES; GEAR MOLDING MACHINES; MOLDING MACHINES; BURNING; CHILLING; SOFTENING; ANNEALING; POURING AND FEEDING; FOUNDRY MATERIALS; ADVANCED MOLDING; MEASUREMENT OF CASTINGS; WROUGHT IRON STEEL, ETC.

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THE FOUNDING OF STATUES; THE ART OF TAKING CASTS; PATTERN MODELLING; USEFUL FOMULAE AND TABLES.

BY SIMPSON BOLLAND,

Practical Molder and Manager of Foundries; Author of "The Iron Founder," etc.

400 Pages Fully Illustrated.

Price $2.50, Post-Paid; with THE FOUNDRY, one year $3.00.

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SHOVELS OF ALL KINDS
BRUSHES

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The A B C of Iron.

The best book for foundrymen published. It is issued in handsome cloth binding, and gives much valuable matter on how to reduce cost of mixtures, and on grading and numbering of pig-iron.

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Molder's Text-Book,

BEING PART II. OF

AMERICAN FOUNDRY PRACTICE,

Presenting the Best Methods and Original Rules for obtaining Good, Sound, Clean Castings, and giving Detailed Description for Making Molds Requiring Skill and Experience; also containing a Practical Treatise upon the Construction of Cranes and Cupolas, and the Melting of Iron and Scrap Steel in Iron Foundries.

By THOMAS D. WEST,

Practical Iron Molder and Foundry Foreman, Member of the American Society of Mechanical Engineers, and of the Civil Engineers' Club of Cleveland, O.

461 PAGES. FULLY ILLUSTRATED.

Price, $2.50, Post Paid; With THE FOUNDRY, One Year, $3.00.

A Word

as to

Joseph Dixon Invented the Plumbago Crucible

DATE OF INVENTION
1826.

Dixon's Crucibles have been in the Market SEVENTY YEARS.

Dixon's Plumbago Crucibles

Dixon's Crucibles are Standard all over the **GLOBE.**
Dixon's Crucibles are used in every country on the Globe where metals are melted.
Dixon's Crucibles have the highest records for **HEATS.**
Dixon's Crucibles are made to get

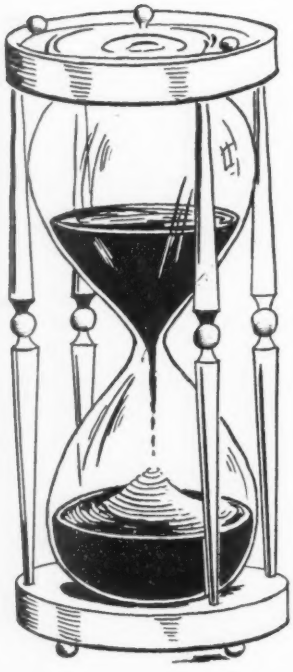
BEST RESULTS WITH THE LEAST COAL.

Dixon's Crucibles are made of many mixtures to suit all kinds of work.
Dixon's Crucibles are made special for Steel Melting.
Dixon's Crucibles are made special for Nickel Melting.
Dixon's Crucibles are made special for Brass Melting.
Dixon's Crucibles are made special for Composition Melting.
Dixon's Crucibles are made special for Phosphor Bronze Melting.
Dixon's Crucibles are made special for German Silver Melting.
Dixon's Crucibles are made special for the Melting of Precious Metals.

In ordering you will be benefitted by mentioning the kind of Metals melted. Write for pamphlet **"How to Use Plumbago Crucibles."** The best are the cheapest, as they must stand the punishment of high heat and much wear and tear. The "Dixon" records in average efficiency, in general good behavoir and in volume of sales, far in the lead.

Jos. Dixon Crucible Company,

JERSEY CITY, N. J.



You are Losing Time

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WHY?

Because some of you are following the **Old Methods.**

Because some of you have let up "pushing things" because of "hard times."

Redouble your efforts!

Buy the Best Moulding Sand, Fire Brick, Facings, Etc.

THAT YOU CAN GET

You are always "losing time" when you use **"Something that will do."** If you use **"WIGTON STEEL," "FRANKLIN CROWN," "SAVAGE," or "SLIGO" FIRE BRICK,** you know you are making no experiment. Our **"McHenry," "Wanatah" or "Riverside" Moulding Sand** for Heavy or Medium Castings, are always reliable. Our **"St James," "Albany," "Newport" or "Centerton" Sand,** used by all up-to-date foundrymen, for Light and Medium Castings, ARE NOT SURPASSED ANYWHERE. Try them and SEE. **Riddles, Shovels, Brushes, Facings, Bellows, Etc,** Write for our book.

The Garden City Sand Co.

1010 SECURITY BLDG., CHICAGO, ILLS.

DURING 1896

We have shipped our goods into every state and territory of the Union and, strange as it may seem, we have filled several orders for foreign countries. Looking back over that period of time and the friends it has brought us, is one of the most pleasant thoughts suggested by this holiday season. Permit us to take the opportunity afforded us to express the wish that 1897 may be a Happy and Prosperous year to every foundryman in the land and that its close may leave only pleasant thoughts in the minds of all. . . . . .

THE S. OBERMAYER COMPANY, Cincinnati, O., Chicago, Ill., Larimer, Pa. . . . . .

THE LARGEST AND THE STANDARD FOUNDRY SUPPLY HOUSE OF THE WORLD

WE MENTION A FEW

FOUNDRY SUPPLIES and EQUIPMENTS

WHICH WE CARRY IN STOCK

Ceylon Plumbago, India Silver Lead, Founders' Perfect Wash, Heavy Machine Blacking, Heavy Stove Plate Facing, National and Eagle Return Facing, Soft, Hard and Steel Wire Brushes, Brass, Galvanized and Steel Wire Riddles, Bellows, Shovels (all grades), Coke Forks, Molders' Tools, Wheelbarrows, Snap Flasks, Pattern Letters, Ladles, Crucibles, Emery Wheels, Sea Coal, Stone Coal, Bituminous Facing, Core Compound, Soapstone, Foundry Flour, Talc, Bolted Cement, Foundry Molasses, Fluor Spar, Stove Putty, Silica, Brass Sand.

All Goods Guaranteed. Trial Samples Free.

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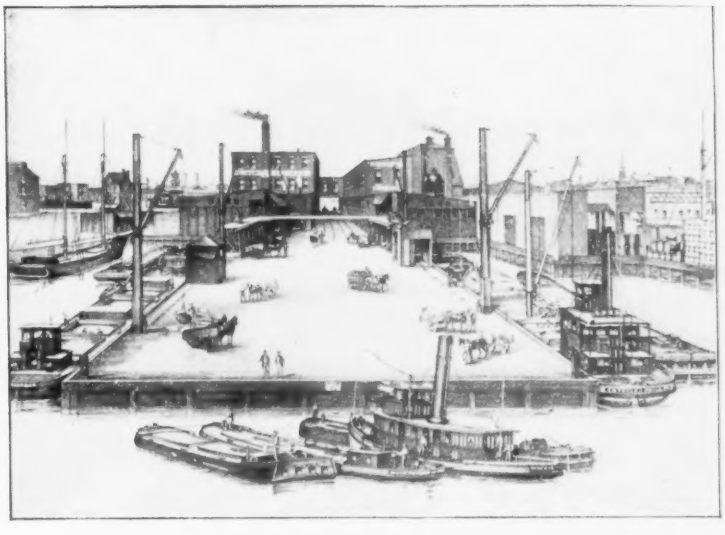
Factories at CINCINNATI, O., CHICAGO, ILL., LARIMER, PA., WHITE HAVEN, PA.

1857-1897.

Forty years' experience digging MOULDING SANDS and CLAYS, and Manufacturing FOUNDRY FACINGS and SUPPLIES.

• FOUNDRY •



EQUIPMENT

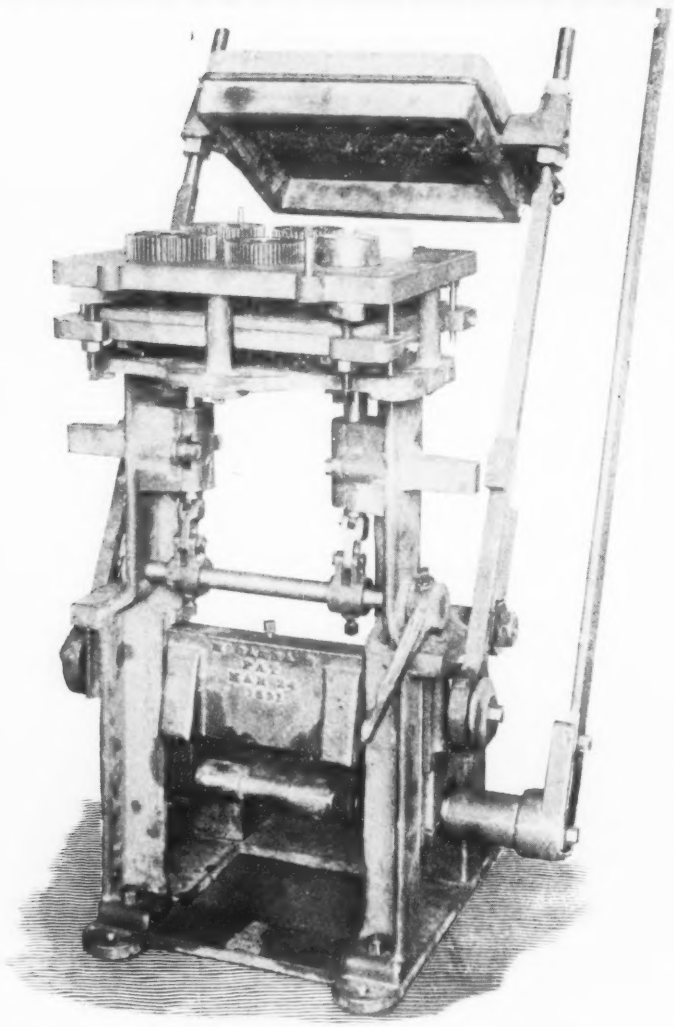
FACINGS.	SANDS.	SUPPLIES.
Plumbago, all grades,	Lumberton Sand,	Wire Brushes,
Stove Plate,	Albany Sand,	Bristle Brushes,
Bituminous,	Burlington I. Sand,	Bellows,
Anthracite,	Tullytown Sand,	Sieves (Brass and Iron.)
xx Facing,	Sharp Sand,	Wheel Barrows,
xx Mineral,	Philadelphia Fine Sand,	Shovels,
Charcoal,	Fire Clay,	Coal Screens,
Soapstone,	Silicaceous Clay,	Coke Forks
Pipe Blacking.	Silica Rock,	Ladles,
	Jersey Gravel,	Buckets (Galv. and Wood)
	Mica Schist.	Chaplets.

J. W. PAXSON & CO.,

PIER 45 NORTH ——— PHILADELPHIA, PA., U. S. A.

THE McCANNA PATENT

[WITH PATTERNS FITTED ON DRAW PLATES.]



MOLDING MACHINE

FOR

Brass Foundries

This machine is simple in construction, having an Automatic, Reversible Rammer and Tucker, which is operated by one stroke of the lever.

CAPACITY, 30 Flasks per hour, all gated, vented and ready to pour. Size Flasks, 11 x 15 x 3 inches.

PRICE, $150.00

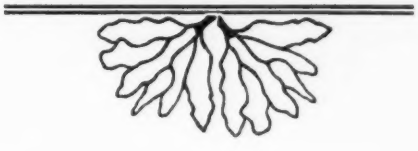
J. W. PAXSON & CO.

PIER 45 NORTH,
Philadelphia, Pa., U. S. A.

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

537=39 West 27th St.,
NEW YORK.

Providence Office,
42 S Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I.
WATERFORD, N. Y.
ALBANY, N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

Geo. P. Millns Foundry Facing Co.

HAMILTON ST. AND C. & P. R. R.

CLEVELAND, O.

Make only the Highest Grade of

Facings and Blackings

OUR SPECIALTIES ARE

G. P. M. Plumbago, G. P. M. Fine Talc, YELLOW and WHITE

G. P. M. Founders' Perfect Wash,

G. P. M. Ingot Blacking, G. P. M. Special ore Wash,

G. P. M. Heavy Facings for Green Sand.

Not an ounce of Lehigh or Coke used by us in above Facings. The compositions are the invention of our Mr. G. P. Millns, whose reputation as maker of High Grade Facings for Jobbing Foundries is known in every State. Our aim is to furnish Foundry Jobbers with Blacking that may be depended upon every time, whether in Green Sand, Loam, Dry Sand or Skin Dried. Pay a fair price, and from us you will receive a full equivalent in quality. Don't be satisfied to make castings as good as someone else, make them better. We make better Facings, and if you are not using our Facings, do so, and you will make better castings.

Facings. Blackings and Supplies of every description.

Correspondence Promptly Answered.

GEO. P. MILLNS FOUNDRY FACING CO.

CLEVELAND, O.

1896 1897

WE desire to thank our many customers in all parts of the country for their liberal patronage during the past year, and take this occasion to extend to them . . . . .

The Compliments of the Season

with our very best wishes for 1897.

THE CLEVELAND FACING MILL CO.
CLEVELAND, OHIO.

TRY OUR CRUCIBLES
THEY GIVE SATISFACTION
McCULLOUGH DALZELL COMPANY.
36 ST. & A.V. RY. PITTSBURG PA.

Crucible.

Crucible

Dipper.

Cover.

Stopper.

Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; Small Crucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

We make All Sizes, from 8 oz. to 2 ton Capacity.

ROBT. J. TAYLOR & SON,

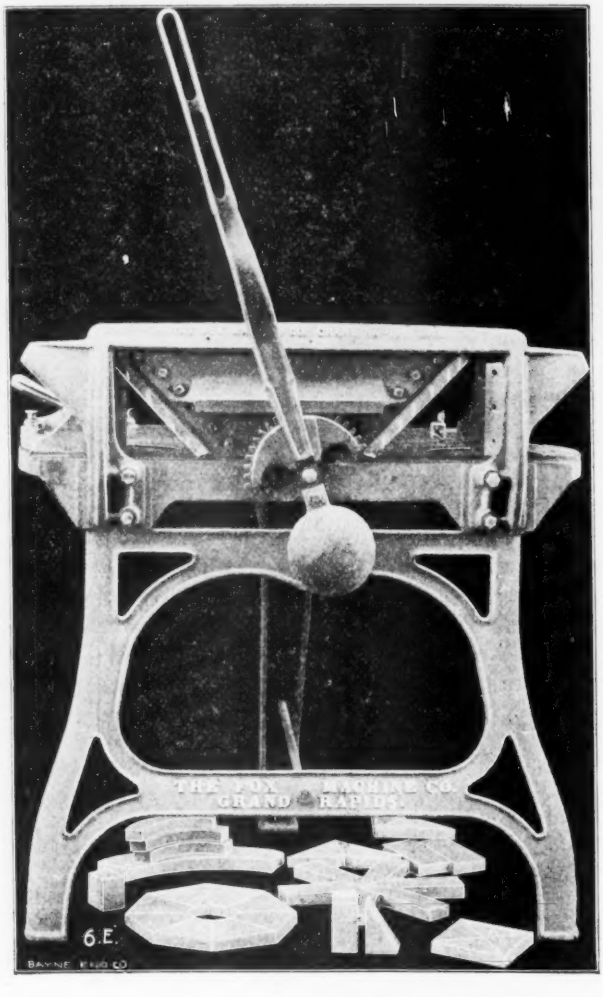
1900 to 1916 CALLOW HILL STREET, PHILADELPHIA, PA.

Well, it's Just

Like this. Do you want a **Universal Trimmer** that is up-to-date and thoroughly practical, or do you want to spend your money for some cheap imitation of the "FOX?"

DON'T NEGLECT THE PATTERN SHOP!

9,000 Sold. That's Evidence Of Merit Isn't it? Why Don't You Try One?



Other People Find Them Profitable You Cannot Afford To Throw Your Money Away.

Cramps Ship Yards, Philadelphia, also all of Her Majesty's Ship Yards and all the best institutions where wood is worked, use the **FOX TRIMMERS.** Get in line with Her Majesty and the rest.

Write to . . **FOX MACHINE CO.** 850 N. Front Street, GRAND RAPIDS, MICH.

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

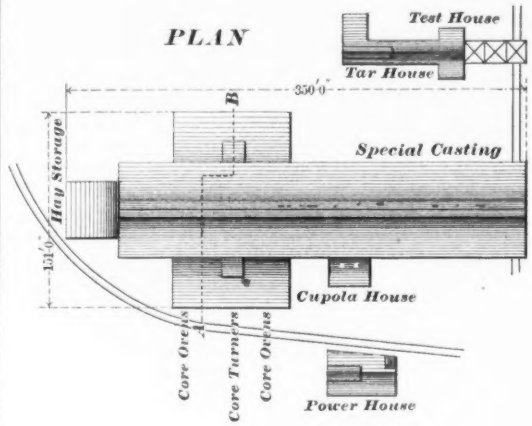
These same Hammers are also especially adapted for calking boilers and heading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

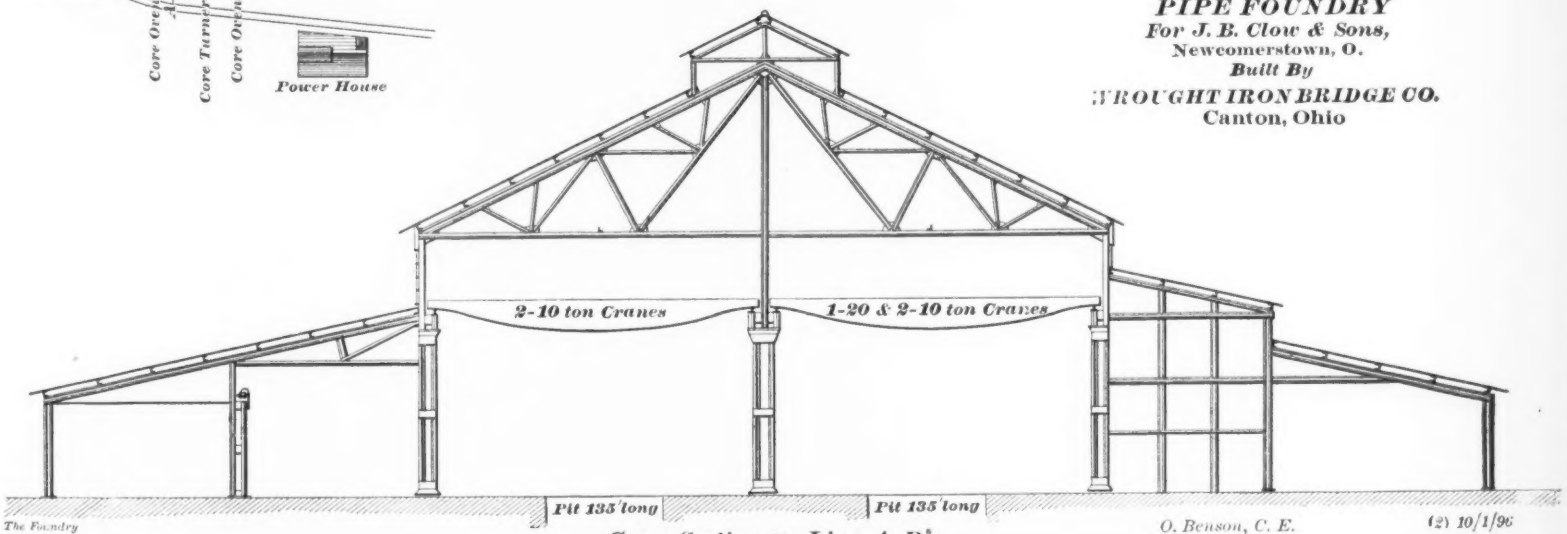
Chicago Pneumatic Tool Co.

635 Monadnock Building, CHICAGO, ILL.



WROUGHT IRON BRIDGE CO.

PIPE FOUNDRY
For J. B. Clow & Sons,
Newcomerstown, O.
Built By
WROUGHT IRON BRIDGE CO.
Canton, Ohio



The Foundry

Cross Section on Line A-B

O. Benson, C. E.
Structural Engineer

(2) 10/1/96

We design and construct Foundries, Machine Shops and similar structures. Also Roofs, Turntables and Bridges of every description.

Principal Office and Works at Canton, O.
Branch Offices at New York, Chicago, Indianapolis and Kansas City.

CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.

The above illustration is an interior view and shows a foundry building designed and built by us for the Pratt & Cady Co., at Hartford, Conn. The central portion is 35 feet in width, with a 15 ton crane, having a travel the full length of the building. Each wing is 20 feet in width and the entire building is 225 feet in length, constructed entirely of brick, iron, and glass, no wood work being used about the building in any way, except in the window sash and casings. The building is absolutely fire-proof.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

GLUTROSE

(TRADE MARK.)

THE UNIVERSAL LIQUID CORE COMPOUND. PATENTED IN THE UNITED STATES, ENGLAND, FRANCE and BELGIUM.

Glutrose was invented and is manufactured by a practical foundryman of many years' experience. Its merits are an established fact, and it has been used in the Pennsylvania Railroad foundry at Altoona, and other large foundries for the past three years with the most satisfactory results.

Economy of Glutrose.

Glutrose is cheaper than flour, oil, or any other core compound used. One 50-gallon barrel will go as far as three barrels of the best flour. Will keep any length of time, and improves with age.

Never varies in quality, whilst flour is always varying.

Claim for Glutrose.

Glutrose makes the most difficult and complicated Cores for Iron or Brass Castings of any size.

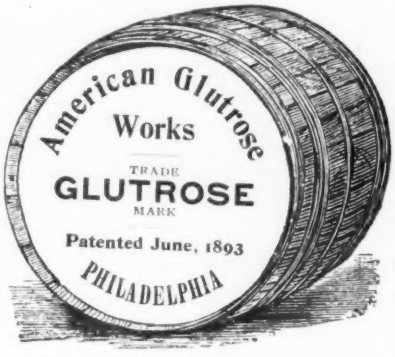
Makes a good, strong Core, keeping thin places and corners sharp and strong.

Dries open and porous inside and hard on the outside, yet the metal will lie well to it.

Makes excellent cores out of burnt sand, enabling foundries to use their sand over and over, thereby saving the expense of buying new sand and carting the old away.

Never spoils your Castings by *blowing*.

Cannot be *wasted*, as when too much is used, making the sand too wet to work well, *more dry sand* must be added, thus correcting the fault without waste.



Leaves the Castings smooth and cores come out easily.

Does *not readily* absorb *moisture* from the mold.

Never *varies* in strength or condition.

Makes no offensive smell or smoke.

Will *never* blow the Castings.

Will *never make the core larger than the core-box.*

Will let the air and gases off from a Core which is difficult to *vent*, better than any other material in use.

Here is a Sample of Hundreds of Letters.

A. Whitney & Sons, Car Wheel Works, Callowhill, 16th and 17th Streets,
Philadelphia, Pa., July 22d, 1895.

American Glutrose Works—GENTLEMEN: Replying to your request for a testimonial as to the merits of Glutrose Core Compound, would say that we have used it exclusively for our cores since 1893, and have every reason to be satisfied with it, both as to its economy and with the results attained with a minimum amount of trouble in mixing. We trust you will be successful in its sale.

Yours truly,
A. WHITNEY & SONS, per Thos. B. Whitney.

. . . REFERENCES . . .

PENNSYLVANIA RAILROAD, Altoona, Pa.
PENNSYLVANIA IRON WORKS, Philadelphia.
GRAY'S FERRY IRON FOUNDRY, Philadelphia.
COX & SONS CO., Bridgeton, N. J.
ATWOOD & MCCAFFREY, Pittsburg.
FLINT, WALLING & CO., Kendallville, Ind.
THE JOHNSON COMPANY, Johnston, Pa.
KINTZER & JONES, Pittsburg.
PUSEY & JONES, Wilmington, Del.
WILLIAMSPORT MACHINE CO., Williamsport, Pa.
HYDRAULIC MACHINE CO., Pittsburg.
G. REBMANN & CO., Philadelphia.
NATIONAL MALLEABLE CASTING CO., Cleveland, O.
HARRISBURG FOUNDRY AND MACHINE CO., Harisburg, Pa.

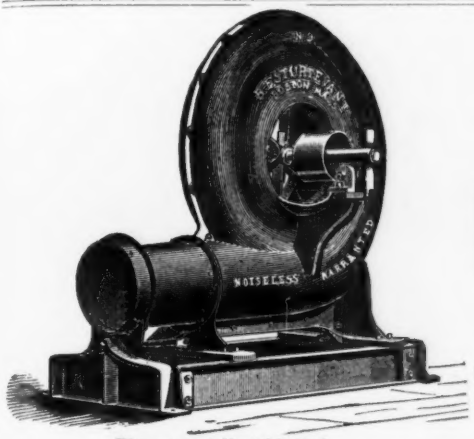
Send for Samples and Price.

AMERICAN GLUTROSE WORKS,

Offices, Penn Mutual Building,

925 Chestnut St., Philadelphia.

. . . Factories . . .
Camden, N. J., Merchantville, N. J.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

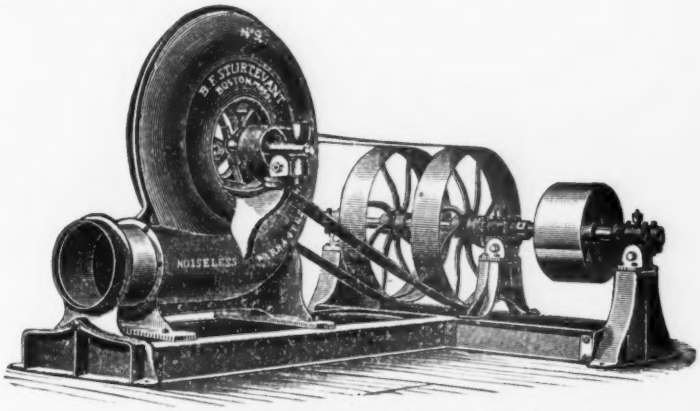
—FOR—

Cupola Furnaces and Forge Fires.

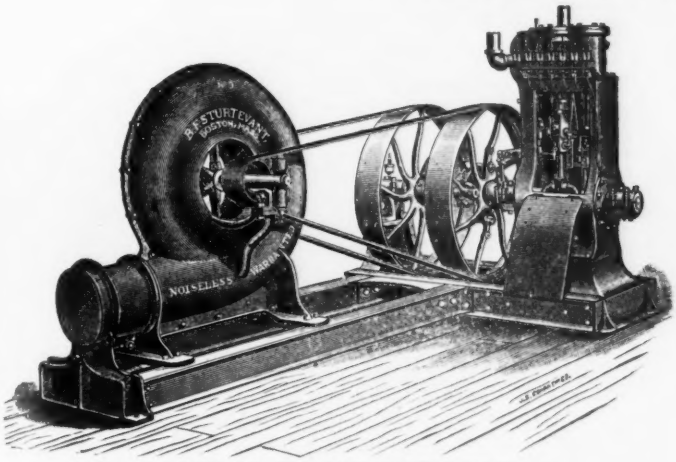
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

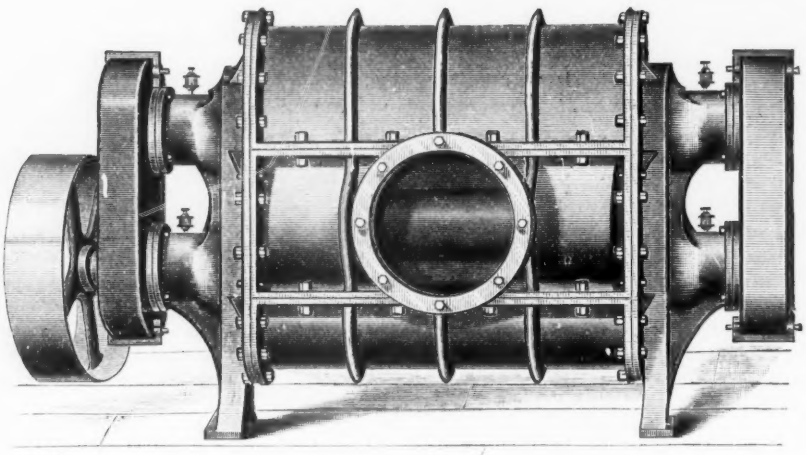
BOSTON, MASS.

131 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Green Rotary Pressure Blower

GIVES THE MOST AIR FOR A $.



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

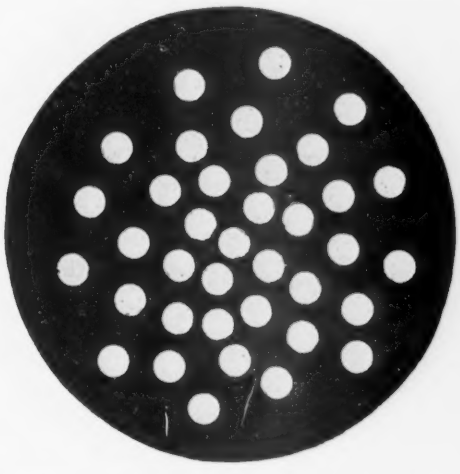
GIVES THE MOST AIR FOR A $.

SEND FOR CATALOGUE.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

The day has gone by—



This cut reproduced from photo of a Plate poured with Clinton Iron direct from blast furnace; size, 4⅜x⅛ thick. The 41 ¾-inch holes were punched out cold without cracking it.

Getting his eye opened.

He wants his money's worth.

Results must be guaranteed.

No time for guess wo k.

Foundrymen are finding out that they cannot use a second class material and get a first class product.

WHEN the American Foundrymen can be easily fooled on the subject of Pig Iron.

He is beginning to find out exactly what he wants and to insist upon getting it.

He does not wish to be experimenting, lose valuable time and work, and spend a lot of money to find out that his iron is too hard or open.

He must know at the start and feel sure that he is getting what he pays for.

We have one of the largest Chemical and Physical Laboratories in the country. Every car of our **Clinton** or **Hector Iron** is rigidly **INSPECTED** and when we tell a foundryman that our iron is suited for his work, we know exactly what quality of iron to ship him and can guarantee the results.

This cut made from photo of ½-inch Test Bar, poured direct from furnace with Clinton Iron and twisted.

CLINTON IRON and STEEL CO.

FURNACE and MAIN OFFICE, **Pittsburg, Pa.**

NEW YORK OFFICE, 15 Cortlandt St.

F. A. Goodrich & Co., (INCORPORATED)

924-5-6 Chamber Commerce, Detroit, Mich.

SOLE SALES AGENTS

"UNION" AND "PENINSULAR"

....HIGH GRADE....

Lake Superior Charcoal Irons.....

FOR CAR WHEELS AND MALLEABLES.

Also Agents for

Globe and Lawrence Ohio High Silicon Irons.

Northern Coke Foundry, Sterling Scotch, Peerless and Iroquois, and the Famous Strong Softener Tuscarawas Black Band Iron.

SOUTHERN COKE IRONS.

****

Connellsville, Washington and Stonega Coke, also
West Virginia Low Sulphur and Pocahontas.

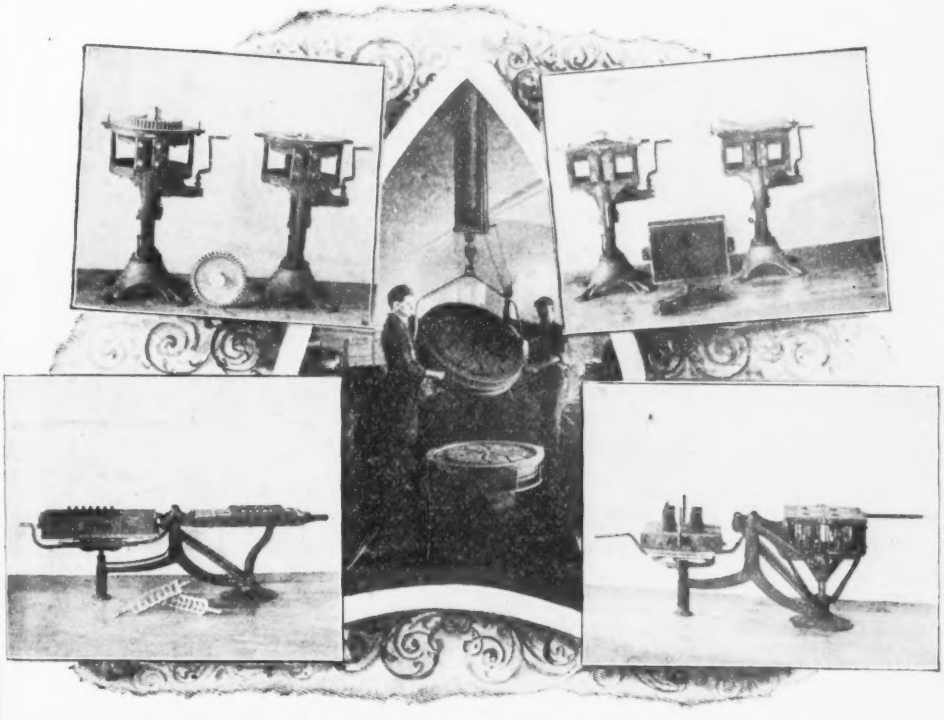
****

WRITE US FOR PRICES BEFORE BUYING.

MOLDING MACHINES

FOR ALL CLASSES OF WORK.

STRAIGHT DRAW, ROCKOVER, AUTOMATIC DRAW ROCKOVER,
IN OVER TWENTY DIFFERENT SIZES.



Guaranteed to pay out in Six Months when run to their full capacity.

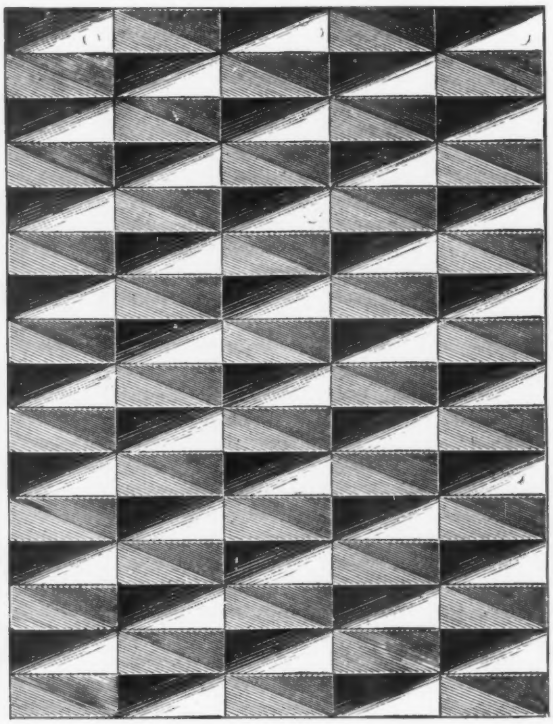
The Pridmore Molding Machines

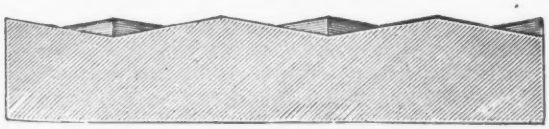
INSURE BETTER AND MORE UNIFORM CASTINGS.
LESSEN COST OF MACHINE WORK ON CASTINGS.
LIGHTEN THE LABOR AND SIMPLIFY FOUNDRY METHODS.
SAVE FIFTY TO SEVENTY-FIVE PER CENT.

Those having Grey Iron or Brass Castings to make in reasonable quantities, will do well to write for full information and lists of many foundries now using these machines. Estimates, prices, terms, etc., will be promptly furnished. Rights to use these machines for Malleable Iron and Steel Castings are reserved. Address

HENRY E. PRIDMORE,

111-113 W. Harrison St., CHICAGO, ILL., U. S. A.





The above cut shows exact size of Diamonds.

Diamond Pattern Lumber.

—FOR—

DOOR SILLS, PLATFORMS, STEP PLATES, Etc.

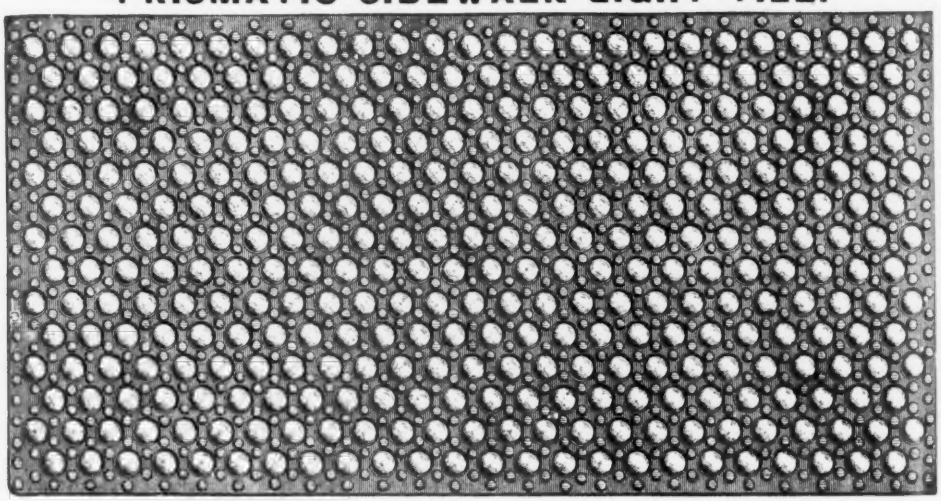
This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 8 feet long by 6 inches wide, and ½ inch thick. Price 10 cents per running foot of 6 inches in width, NET CASH crated and delivered f. o. b. Chicago, in orders of not less than 6 pieces. Send for sample.

BROWN BROS. MFG. CO.

Cor. Clinton and Jackson Sts. Chicago.

PRISMATIC SIDEWALK LIGHT TILE.



Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

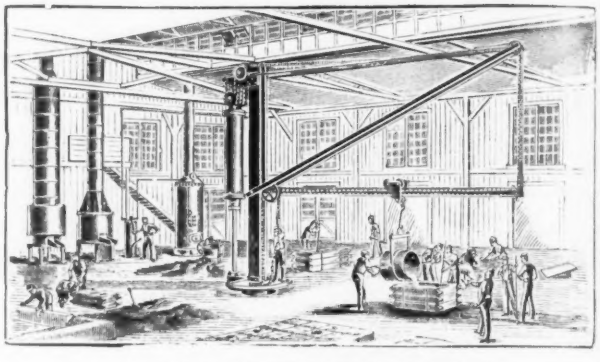
BROWN BROS. MFG. CO.,

Mention THE FOUNDRY. **Cor. Jackson and Clinton Sts. CHICAGO.**

WASHINGTON COAL & COKE CO.
Washington Coal · High Grade Coke.
CAPITAL PAID UP
$250,000.00
DAWSON, PA.
INDIVIDUAL CARS.
N. P. HYNDMAN, Sales Agent
PITTSBURG PA
COAL MINES & COKE WORKS
On Pittsburg & Lake Erie Railroad
GENERAL OFFICE
Dawson, Pa
SALES OFFICE
Pittsburg Pa.
P. G. COCHRAN, President
JNO. H. WURTZ, Secretary
J. R. LAUGHREY, Treasurer
J. B. NEWMYER, Manager

The Receiver, Assignee and Sheriff

Have been much in evidence these several years, but a man particularly a Foundryman, can't "bust" if he is tied to the Ridgway Crane. It is simply impossible. During all these hard times when everybody has had to navigate very carefully, none of the foundries using Ridgway Cranes have had any trouble making both ends meet.

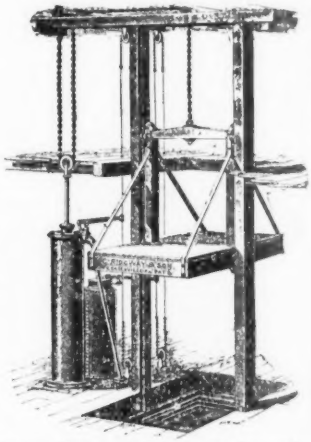


5-ton Steam-Hydraulic Crane in a Foundry.

And no wonder! When you can have a machine by which the same molders can for the same wages turn out 50 per cent. more work and never lose a casting, you simply can't help doing a safe business even at low prices.

That's just exactly the kind of a machine the Ridgway Crane is, as dozens of Foundries will tell you if you ask them nicely.

There was a big prosperous concern built a new foundry not a great while ago, and wrote us about cranes. We didn't go to see them because they didn't invite us to do so. But sent them our literature and wrote them our sweetest. Tried all we could to get them to go and see some foundries where Ridgway Cranes were in use. All in vain. They got the usual sort—thought we were telling fairy stories, we reckon. The other day the newspapers announced their "going under." And we are bold enough to assert that the mere adopting of the Ridgway Crane would have prevented all that. In that one foundry on their character of work the Ridgway Crane would have saved thousands of dollars every year.



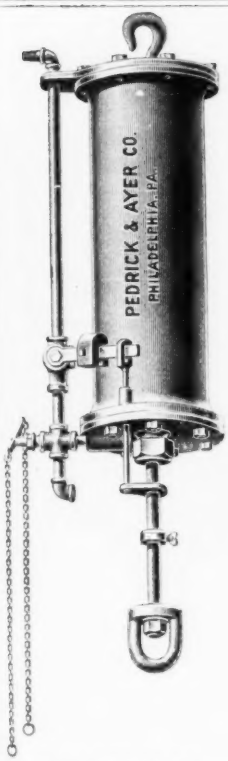
Steam-Hydraulic Elevator, also made direct acting with cylinder under platform.

The simple fact is, hundreds of foundrymen can't half realize what a wonderful machine we offer them in this crane. Lots of foundrymen do "catch on" and get the cranes. They mostly "saw wood and say nothing," unless you go and see them, and if you are not a competitor, will tell you things that will send you to us in a hurry.

"PLEASE TAKE THE ELEVATOR."

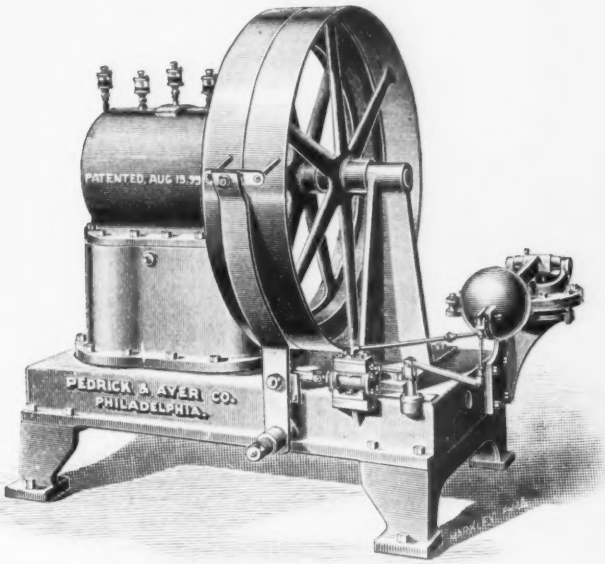
The Iron Man's Joy.

CRAIG RIDGWAY & SON, COATESVILLE, PA.



Automatic Compound Belt Air Compressors.

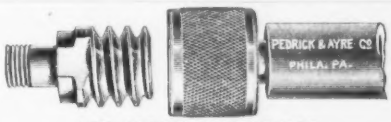
PATENTED AUGUST 13TH 1895.



Straight Lift Hoist.

Built in two sizes, Nos. 1 and 2.

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11x 6 6x 6	100-100	32- 50	2-3½	40x4½	2875 lbs.	60x40	Parian
2	1 x10 8x10	90-120	90-130	5-7	60x6	5370 lbs.	76x60	Parish



AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

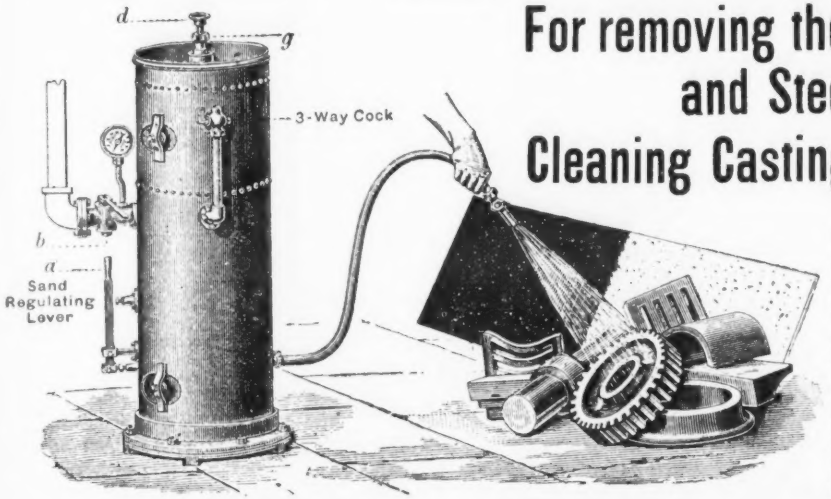
PEDRICK & AYER CO.

SPRING GARDEN STATION, PHILADELPHIA, PA.

Improved Patent Sand Blast Machinery.

TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

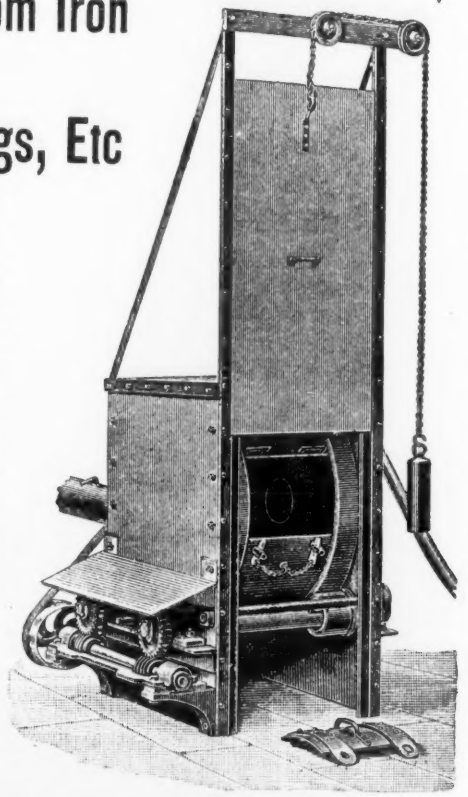
For removing the Scale from Iron and Steel Plates, Cleaning Castings, Forgings, Etc



By the use of common, sharp, dry sand, and with compressed air at from 10 to 15 lbs. pressure to the square inch to propel the sand, this Machinery will **CLEAN** all forms of castings (from the very largest weighing several tons to the smallest) **more thoroughly** than is possible by hand, at **half the total cost**, and in a space of time that cannot be conceived until the Machinery has been seen in actual operation.

For small castings, a Special Tumbling Barrel (as shown herewith) is used in connection with the Sand Blast Apparatus where the Blast is directed through one or both ends of the Cylinder against the articles placed therein. The work being done by contact of grains of sand traveling at a high velocity, no portion of the surface of the castings can escape the action of the Blast, still in consequence of the slow revolutions of the Barrel and the shortness of the operation, the sharp outlines of the castings are well preserved.

The Air Compressor and Air Tank used in connection with this Machinery are especially designed to supply, most economically and satisfactorily, the requisite amount of free air at the required pressure.



Barrel.

FOR FURTHER PARTICULARS, ADDRESS

WARD & NASH,

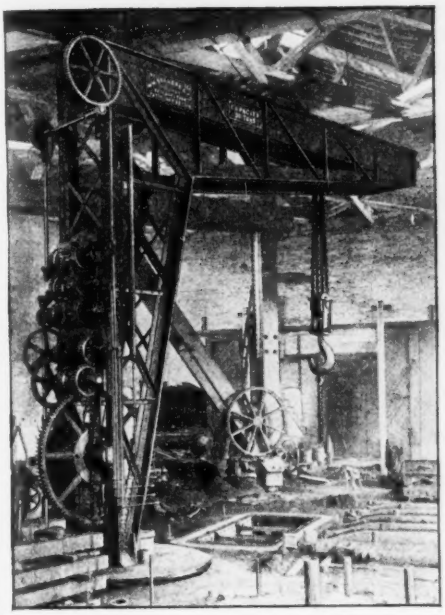
SOLE AGENTS,

23-25 PURCHASE ST., BOSTON. 35-37 S. CANAL ST., CHICAGO.

William Sellers & Co., Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY



In connection with our Machine Tool Business, we conduct a large foundry where practical tests are continually made of new labor-saving devices. The manufacture of

IMPROVED FOUNDRY CRANES

has become an important feature.

The accompanying illustration shows a quick-acting 30-ton Steam Jib-Crane, erected in the foundry of J. Morton Poole Co., Wilmington, Del., superceding old wooden cranes, one of which appears in the background.

This crane is driven by independent 8" x 8" engines. The platform levers are near the floor. The effective radius of hook is 23 feet.

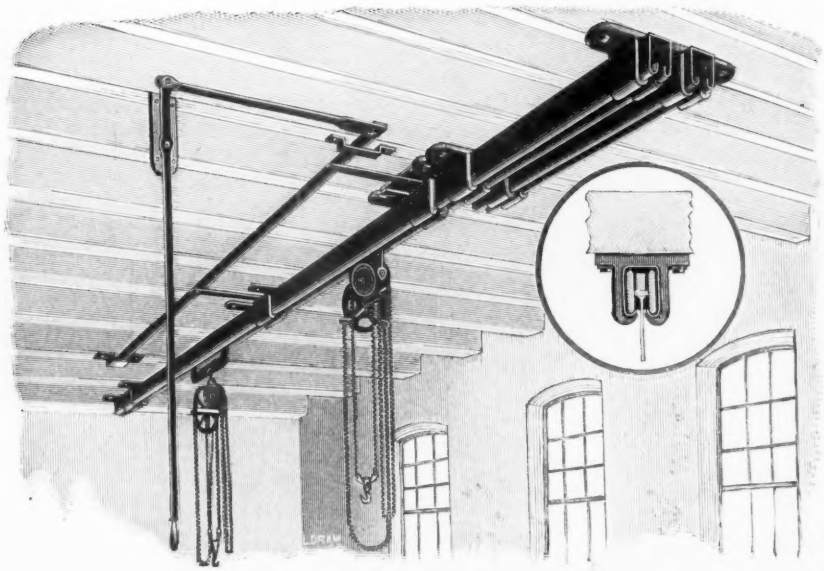
In future issues of this magazine, we will show illustrations of Jib and Traveling Cranes operated by electric motors.

Centrifugal Sand Mixer

Since the introduction and favorable reception of this effective, expeditious and economical **machine for preparing sand for molds and cores** we have simplified its construction and cheapened its cost. The capacity of the machine is remarkable, being limited only by the facilities for feeding sand into the hopper. Two men will easily shovel 5 tons an hour into the machine.

The qualities of "toughness" and "porosity" are materially improved by this process of preparing molding sand.

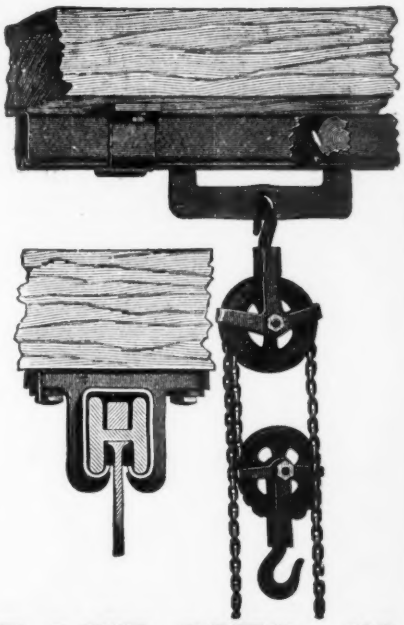
23-25 PURCHASE ST., BOSTON. 35-37 S. CANAL ST., CHICAGO.



THE PATENT

Overhead Trolley Track System

Is the coming improvement in the iron foundries of this country and in many cases can be made to pay for itself in a few months.



Just the thing for

Carrying Iron from Cupola to Floors.
Carrying Castings from Floors to Cleaning Rooms. . . . .
Lifting, Rolling or Moving Flasks. .

All who have adopted this system have expressed themselves as being delighted with it.

Write us for Circulars, Estimates and Full Particulars.

COBURN TROLLEY TRACK MFG. CO.

HOLYOKE, MASS.

Over
10,000
in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries

In addition to 400 Railroads and over 300 Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, '96.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensible to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

REQUEST CIRCULARS FROM

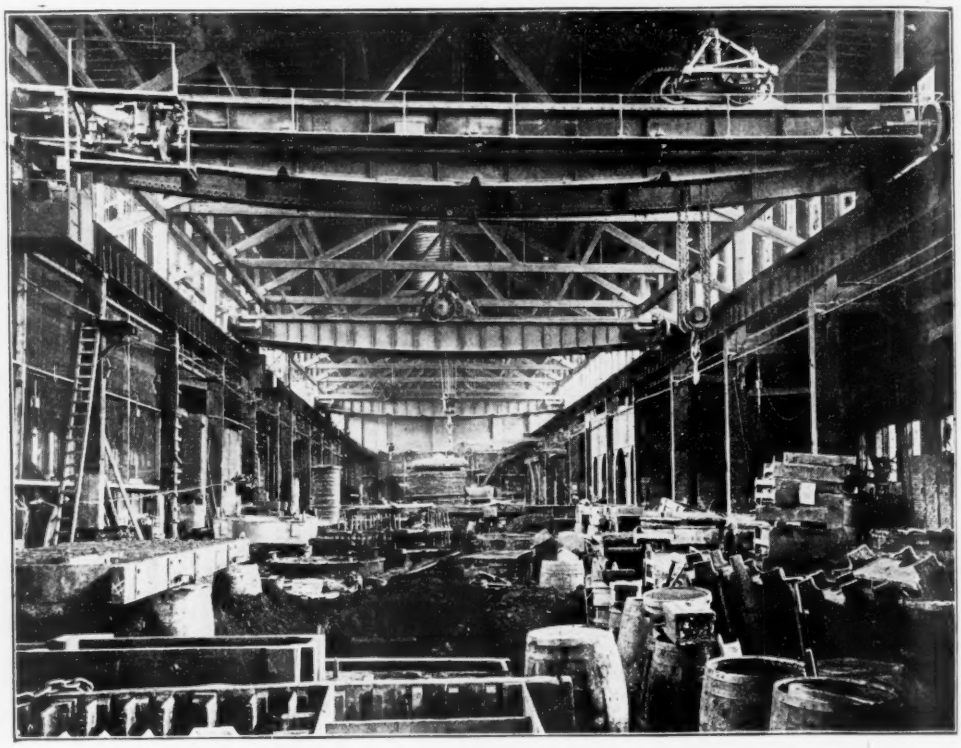
THE WELLS LIGHT M'F'G. CO.

EDWARD ROBINSON, Sole Proprietor.

MENTION THE FOUNDRY. 44-46 WASHINGTON STREET, NEW YORK.

The Edw. P. Allis Co.

Milwaukee, Wis. have the largest foundry (exclusively for machinery castings,) in the United States. Its interior is shown by the following cut. . . . .



The daily melt is from 60 to 90 tons. All the heavy work is done under and handled by **THREE** thirty ton

Shaw Electric Traveling Cranes,

The first of which was put in operation in 1889, the second in 1891 and the third in 1893. Besides these, there are three more Shaw Cranes in the erecting and machine shops.

These Crane are Made Only by

THE SHAW ELECTRIC CRANE CO.

MUSKEGON, MICH.

——And Sold Only by——

Manning, Maxwell & Moore,

424 TELEPHONE BUILDING, PITTSBURG.

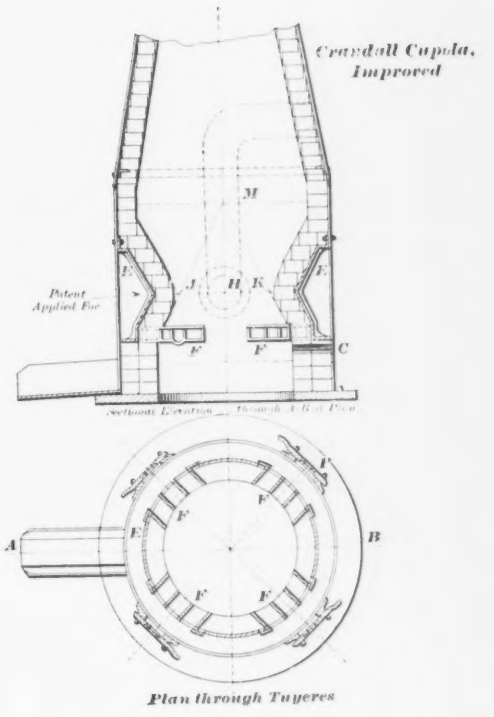
60 S. CANAL ST., CHICAGO, ILL. **111 LIBERTY ST., NEW YORK.**

"Eureka"

We know what it means and are satisfied it is correct.

...WHAT?

The shape shown in cut of course. We have experimented and are sure we are right. If you give the **Crandall Cupola** a trial you will fully agree with us on this point. We can furnish the complete cupola, or the lower section, which can be attached to almost any existing cupola, and by so doing make a great improvement over your present method of melting, as we penetrate the center of cupola with our blast, at the same time having a very large melting zone, shown at M.



Plan through Tuyeres

- Cupola Furnaces
- Blowers
- Cranes
- Compressors
- Hoists
- Elevators
- Foundry and Core Oven Cars
- Ladles
- Reservoirs
- Tumbling Mills
- Core Ovens
- Sand Sifters
- Brass Furnaces
- Testing Machines
- Trolley Tracks
- Foundry Lights
- Flasks
- Fire Brick
- Fire Clay
- Molding Sand

With straight walls nearly one-half the volume of blast escapes up the sides, and with it a great number of units of heat, with irregular walls the blast must penetrate the fuel as it lays very close at incline below melting point, consequently it passes through the fuel and gives the necessary combustion. What you are all looking for is the greatest amount of heat with the least amount of blast, fuel and brick, that is what we can give you.

We have everything used in a Foundry.

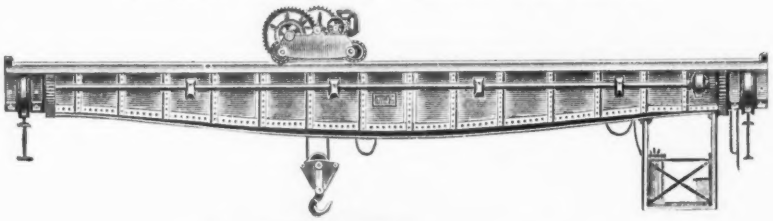
The Foundry Outfitting Co.

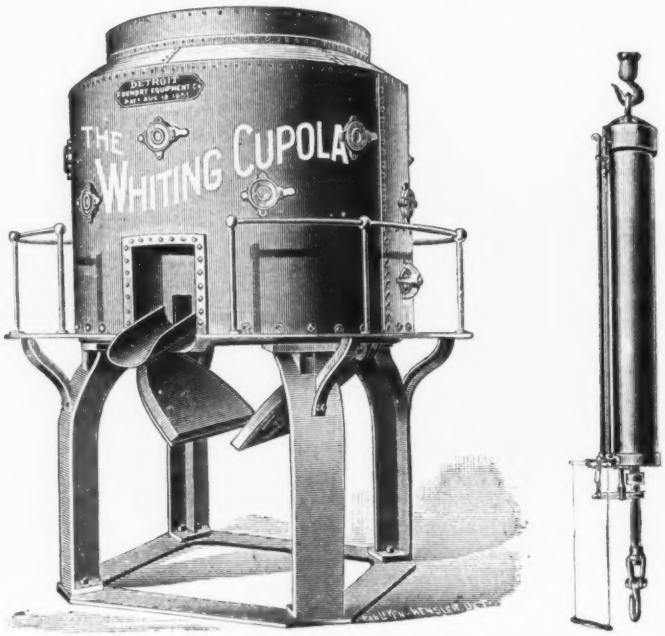
DETROIT, MICH.

Whiting Foundry Equipment Co.

HARVEY, ILL. (Chicago Suburb.)

CHICAGO OFFICE—1522 MONADNOCK BLOCK.



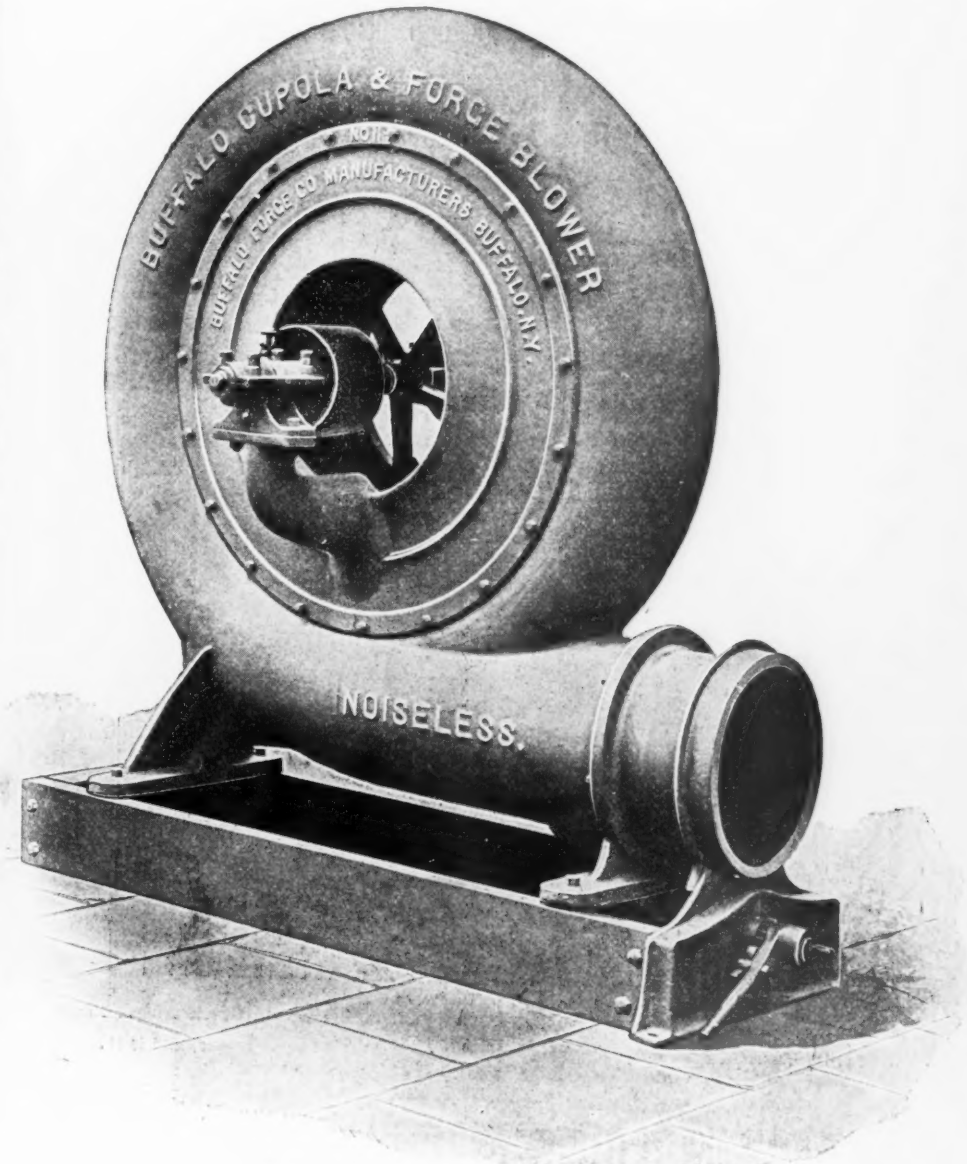


Manufacturers of

CRANES, CUPOLAS, AIR HOISTS, LADLES,

TUMBLERS, TRUCKS, TURNTABLES,
FLASKS, Etc.

COMPLETE FOUNDRY PLANTS. Send for Catalogue.



A BUFFALO BLOWER—ENOUGH SAID.

No Stripping Plates

Required when you use a

"TEETOR"

A MONEY SAVER.

A MONEY EARNER.

THE NEW TEETOR possesses many points of advantage over all other styles, and is the most convenient and easiest operated machine on the market.

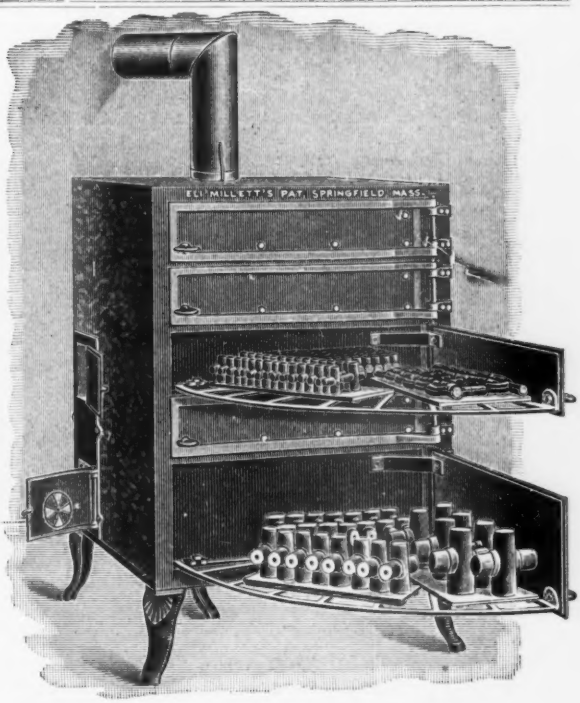
TEETOR MOLDING MACHINE CO. INDIANAPOLIS, IND.

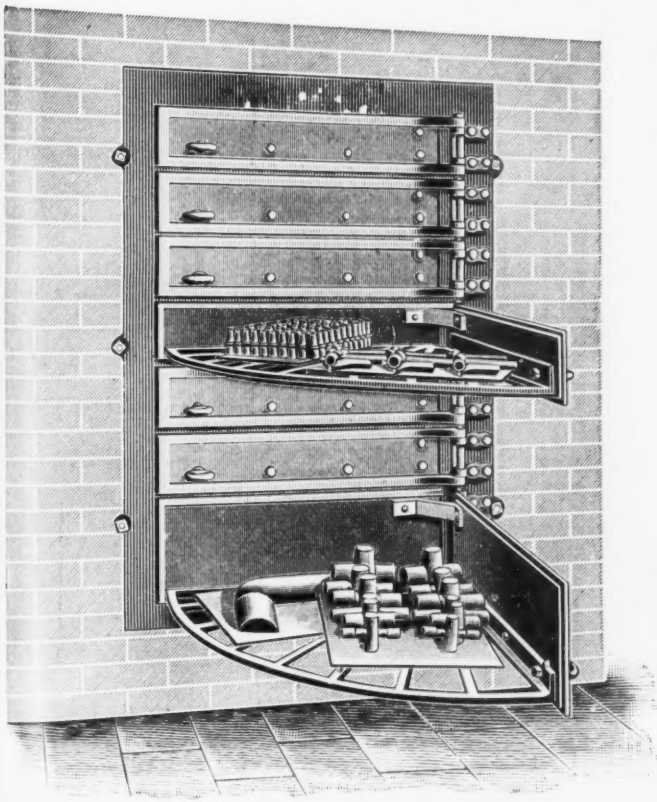
Ever get in a Hurry for a Core?

Perhaps a small one,
Perhaps not so small.

The "MILLETT"

Is simply the greatest Time and Money Saver you can have in your foundry.





WE CAN PROVE IT

Will ship on thirty days trial, return if not pleased.

Hundreds in use and Thousands of Dollars being saved annually, not to mention comfort and better work.

Millett Core Oven Co.

BRIGHTWOOD, MASS.

BUYERS' DIRECTORY.

ALUMINUM.
Cowles Electric Smelting & Aluminum Co., Lockport, N. Y.

AIR HOISTS.
Ingersoll-Sergeant Drill Co., New York, N. Y.
Whiting Foundry Equipment Co., Harvey, Ill.
Pedrick & Ayer, Philadelphia, Pa.

AIR COMPRESSORS.
Pedrick & Ayer, Philadelphia, Pa.

BLOWERS.
Buffalo Forge Co., Buffalo, N. Y.
Connersville Blower Co., Connersville, Ind.
Root, P. H. & F. M. Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass.
Wilbraham Baker Blower Co., Philadelphia, Pa.

BRASS FOUNDERS' SUPPLIES.
Brass Founders' Supply Co., Newark, N. J.

BRONZES.
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

CHARCOAL.
Springfield Facing Co., Springfield, Mass.

COKE.
Washington Coal and Coke Co., 7 Wood St., Pittsburg, Pa.
Goodrich & Co., F. A., Detroit, Mich.

CORE COMPOUNDS.
American Glutrose Works, Philadelphia, Pa.
Vreeland Tompkins, Jersey City, N. J.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
Foundry Outfitting Co., Detroit, Mich.
Whiting Foundry Equipment Co., Chicago.

CRANES.
Addyston Pipe and Steel Co., Cincinnati, O.
Craig, Ridgway & Son, Coatesville, Pa.
Shaw Electric Crane Co.
Wm. Sellers Co.
Whiting Foundry Equipment Co., Harvey, Ill.

CRUCIBLES.
Joseph Dixon Crucible Co., Jersey City, N. J.
Hussman Crucible Co., St. Louis, Mo.
McCullough-Dalzell Co., Pittsburg, Pa.
Taylor Crucible Co. oRbert J., Philadelphia, Pa.

CUPOLAS.
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

ELEVATORS.
Ridgway & Son, Craig, Coatesville, Pa.

ENGRAVING.
Peninsular Engraving Co., Detroit, Mich.

FIRE-BRICK.
Brooklyn Fire Brick Works, Brooklyn, N. Y.
Obermayer Company, The S., Cincinnati, O.
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whitehead Bros. Co., New York.
Whitehead Bros .Co., New York.

FLASKS.
Diamond Clamp & Flask Co., Richmond, Ind.
Brass Founders' Supply Co., Newark, N. J.

FLEXIBLE SHAFTS.
Stow Mfg. Co., Binghamton, N. Y.
Chicago Flexible Shaft Co., Chicago.

FOUNDRY LADLES.
Foundry Outfitting Co., The, Detroit.
Obermayer Company, The S., Cincinnati, O.
Paxson & Co., J. W., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whitehead Bros. Co., New York.
Whiting Foundry Equipment Co., Harvey, Ill.

FOUNDRY PLANS.
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

FOUNDRY SUPPLIES.
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J. S. McCormick Company.
Millns Facing Co., Geo. P.
Cleveland Facing Mills Co.
Obermayer Company, The S., Cincinnati, O.
Paxson & Co., J. W., Philadelphia, Pa.
Smith Foundry Supply Co., Cincinnati, Ohio.
Springfield Facing Co., Springfield, Mass.
Whitehead Bros. Co., New York.

GRINDING MACHINERY.
Diamond Machine Co.
Chicago Flexible Shaft Co.
Stow Mfg. Co.

ILLUMINATING.
Wells Light Mfg. Co.

IRON BUILDINGS.
Berlin Iron Bridge Company, East Berlin, Conn.
Wrought Iron Bridge Company, Canton, O.

IRON FILLER.
Vreeland Tompkins, Jersey City, N. J.

MANGANESE AND SILICON.
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

MOLDING MACHINES.
The Adams Co., Dubuque, Ia.
Pridmore, Henry E.
Teetor Molding Machine Co.

MOLDING SAND.
Foundry Outfitting Co., The, Detroit.
Garden City Sand Co.
Paxson & Co., J. W., Philadelphia, Pa.
Whitehead Bros. Co., New York.

PATTERN MAKERS.
The Gobeille Pattern Co., Cleveland, Ohio.

PATTERN MAKERS SUPPLIES.
Frank H. Clement Co., Rochester, N. Y.
Fox Machine Co., Grand Rapids.

PATTERN LETTERS.
Knight & Son, W. H.

PNEUMATIC CLIPPING TOOLS.
Chicago Pneumatic Tool Co.
Clement Pneumatic Tool Co.

SAND SIFTERS.
Wm. Sellers & Co., Philadelphia, Pa.
Gould & Eberhardt.

SAND BLAST MACHINERY.
Ward & Nash.

SEPARATORS.
Audubon Machine Co.

SKYLIGHTS.
Translucent Fabric Co.

TROLLEY TRACKS.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.

TUMBLING BARRELS.
Gould & Eberhardt, Newark, N. J.
Paxson & Co., J. W., Philadelphia, Pa.
Stover Mfg. Co., Freeport, Ill.
Whiting Foundry Equipment Co., Harvey, Ill.

WHEELBARROWS.
Syracuse Chilled Plow Co.

WIRE BRUSHES.
Brand & Co., S. H.
Rice Mfg. Co.
Buchel Wire Brush Co.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page - -	per month, $20.00
Half page - - -	" 12.00
Quarter page - -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates thus giving it to all alike, and no reduction of any sort on the above rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

THOUSANDS OF DOLLARS

Are thrown away annually by Foundrymen who overlook the great waste that occurs in the amount of iron that is cast away with cinders.

Tumbling Barrels save a great deal, but still many foundries throw away a great number of tons in the course of a year.

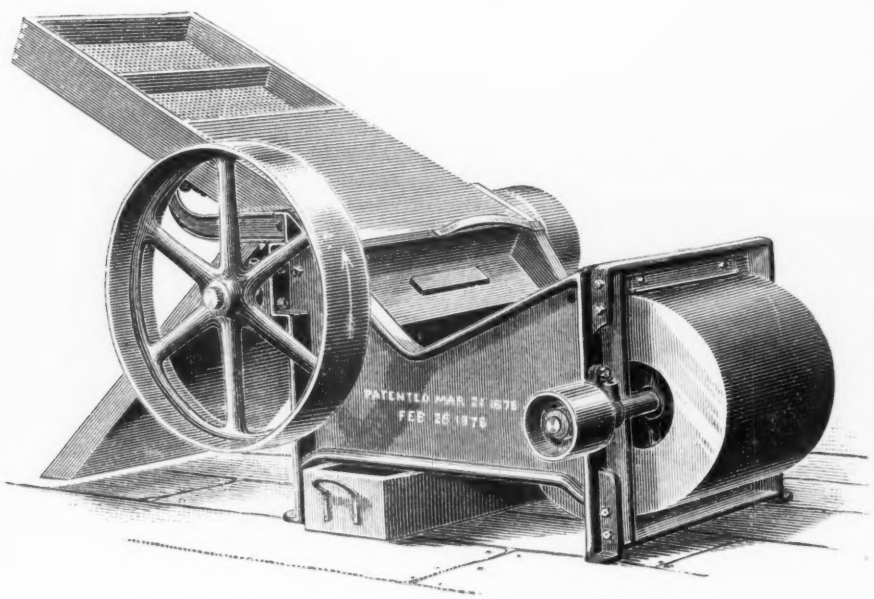
Here is what one well-known concern that has used our Separator for many years has to say of it.

GRIFFIN WHEEL COMPANY. CHICAGO, Dec. 6th, 1895.

THE AUDUBON MACHINE WORKS,
41 Whitney Bldg., New Haven, Conn.

GENTLEMEN:—We are in receipt of your favor of the 2nd inst. The Separator Machine recently purchased of you does not replace the one of your make which we have in use here, but is to be put into service by us at our Denver Plant. We, however, consider the machine satisfactory in all respects and have no objection to giving you a testimonial to that effect.

Yours truly,
GRIFFIN WHEEL COMPANY,
R. ORTMANN, Secretary.



It will pay for itself in a short time, and afterwards it will start to pay you.

THE AUDUBON MACHINE CO.

NEW HAVEN, CONN.

PHONE
798.

The Peninsular Engraving Co.

COPPER & ZINC ETCHINGS IN HALF-TONE & LINE FOR ALL ARTISTIC AND MERCANTILE PURPOSES.

EVENING NEWS BUILDING, COR. LARNED & SHELBY STS.

DETROIT, MICH.

DIRECTORY OF LEADING PIG IRON DEALERS.

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

HENRY H. ADAMS & CO.

(Incorporated)

PIG IRON

Sole Agents for the Celebrated "NORWAY," for combined Strength and Softness.

177 Broadway,
NEW YORK CITY, N. Y.

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,
Philadelphia.

THE DOMHOFF & JOYCE CO.

PIG IRON-COKE.

CINCINNATI.

CLINTON IRON & STEEL CO.

Manufacturers of the
CLINTON INSPECTED FOUNDRY IRON
CELEBRATED "CLINTON" SOFTENER
PITTSBURG, PA
15 Cortlandt St., NEW YORK.

F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

MILLER, WAGONER & BENTLEY,

PIG IRON.

Steel, Ore, Coke and Cinder.

Long Distance Telephone No. 842. COLUMBUS, OHIO.

PICKANDS, BROWN & CO.,

Manufacturers, Importers and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO.
BUFFALO,
PHILADELPHIA, NEW YORK,
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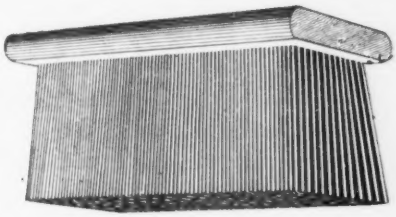

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Backs all in One Piece—can't come apart, and **rounded** to suit the **hand,** a feature **never found in any other brush on the market.**

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If you don't you are not keeping up with the times.

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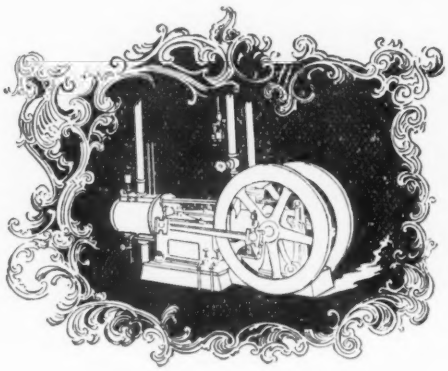

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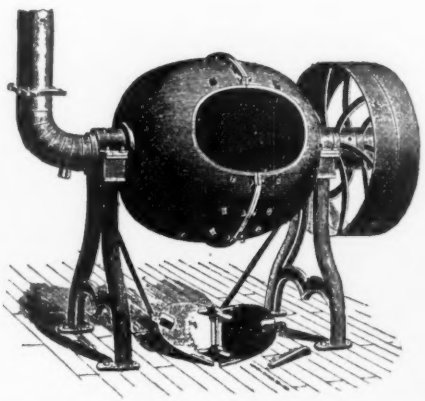

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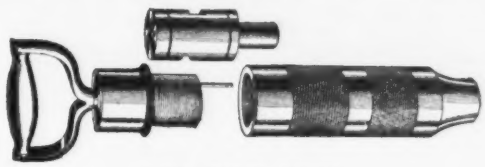

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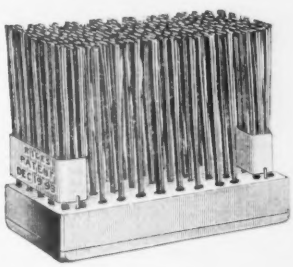

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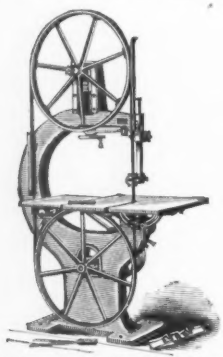

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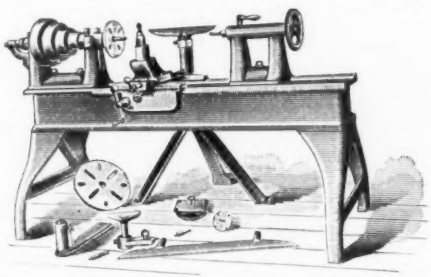

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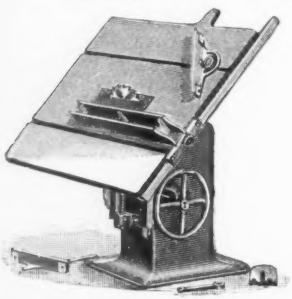

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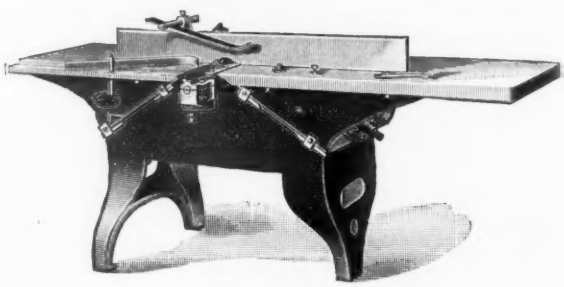

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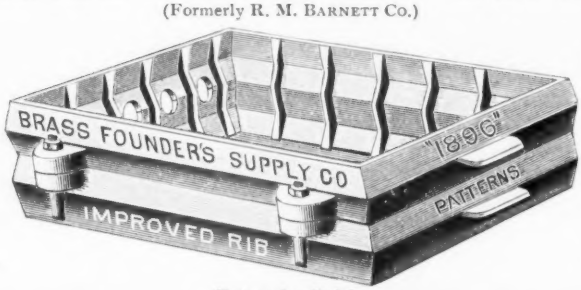

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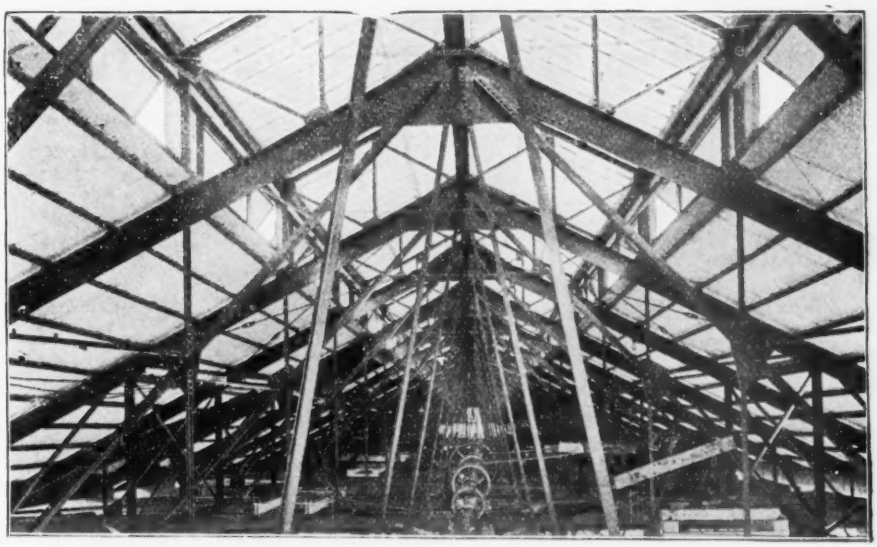

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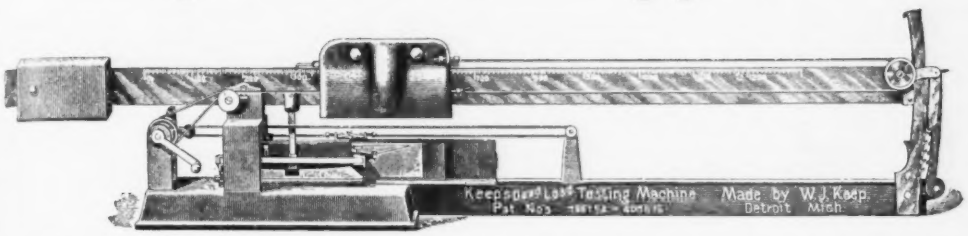

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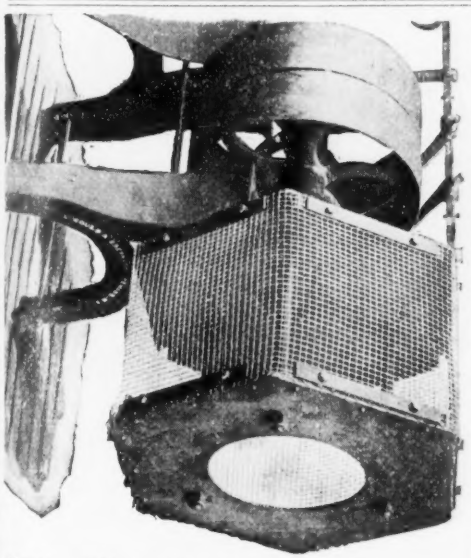

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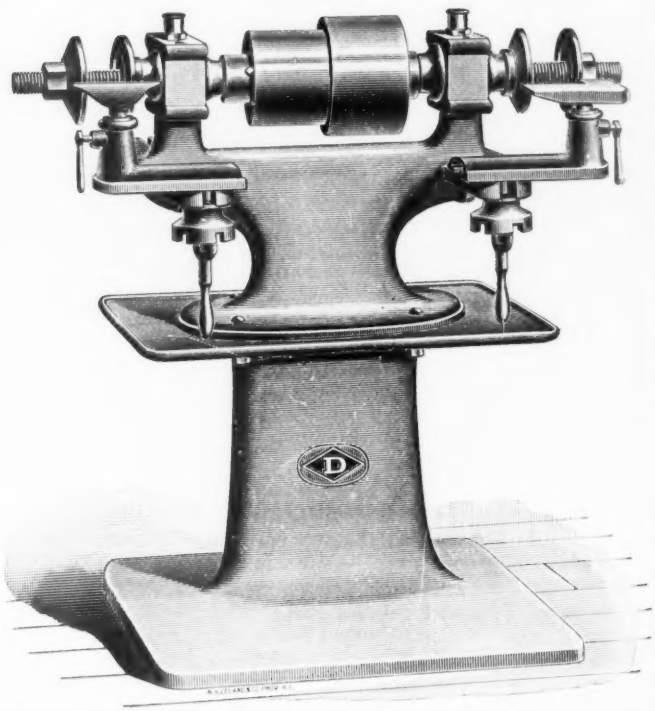

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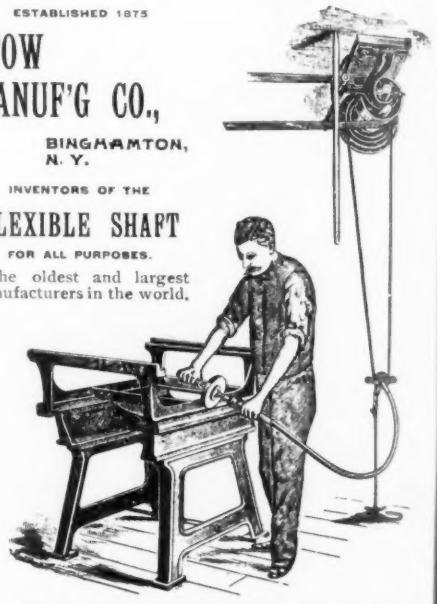

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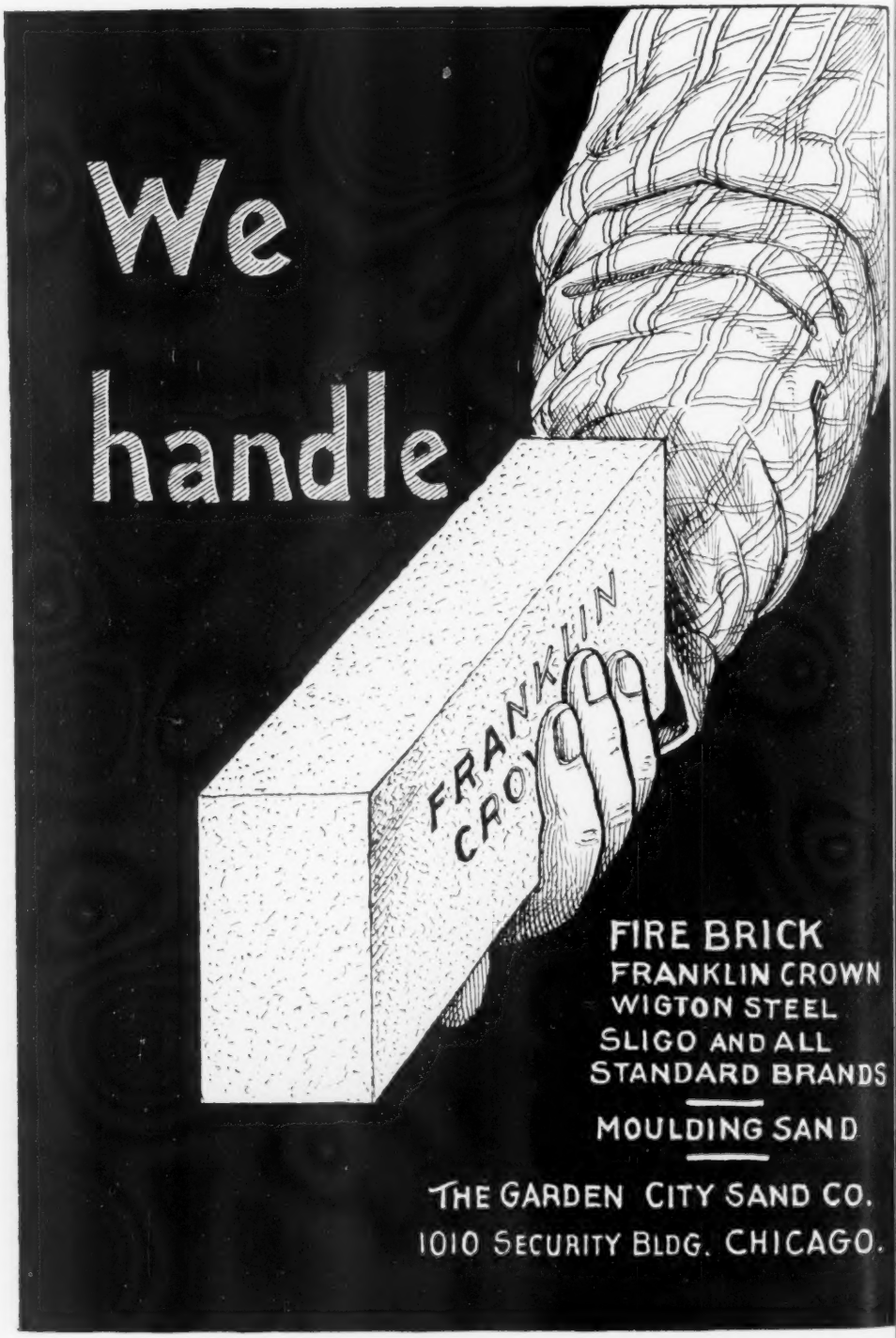
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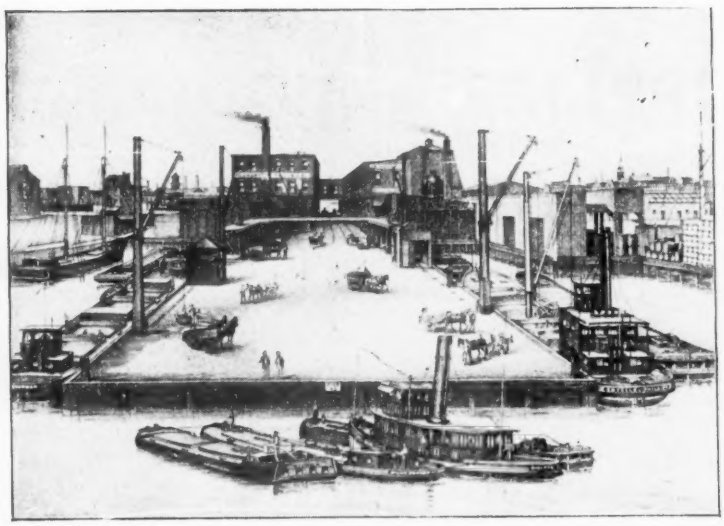

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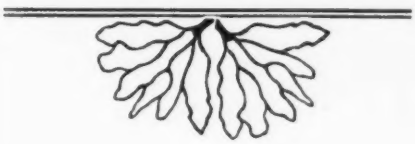

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CRESCENT, N. Y.

TRY OUR CRUCIBLES
THEY GIVE SATISFACTION
McCULLOUGH DALZELL COMPANY.
36 ST. & A.V.RY. PITTSBURG PA.

Crucible.

Crucible

Dipper.

Cover.

Stopper.

Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; Small Crucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

We make All Sizes, from 8 oz. to 2 ton Capacity.

ROBT. J. TAYLOR & SON,

1900 to 1916
CALLOW HILL STREET, PHILADELPHIA, PA.

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and heading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

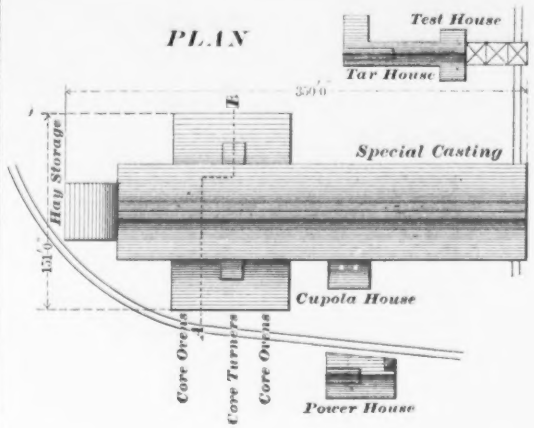
All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

Chicago Pneumatic Tool Co.,

635 Monadnock Building, CHICAGO, ILL.

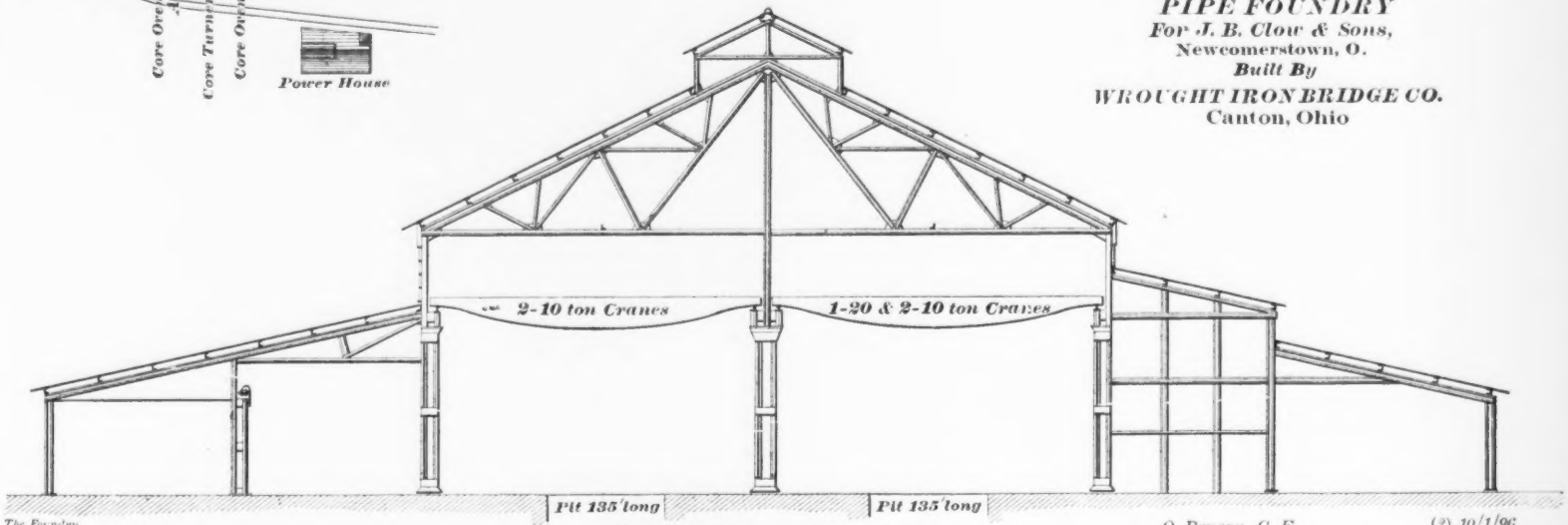
THE FOUNDRY.

PLAN



WROUGHT IRON BRIDGE CO.

PIPE FOUNDRY
For J. B. Clow & Sons,
Newcomerstown, O.
Built By
WROUGHT IRON BRIDGE CO.
Canton, Ohio



The Foundry

Cross Section on Line A-B

O. Benson, C. E.
Structural Engineer

(2) 10/1/96

We design and construct Foundries, Machine Shops and similar structures. Also Roofs, Turntables and Bridges of every description.

Principal Office and Works at Canton, O.
Branch Offices at New York, Chicago, Indianapolis and Kansas City.

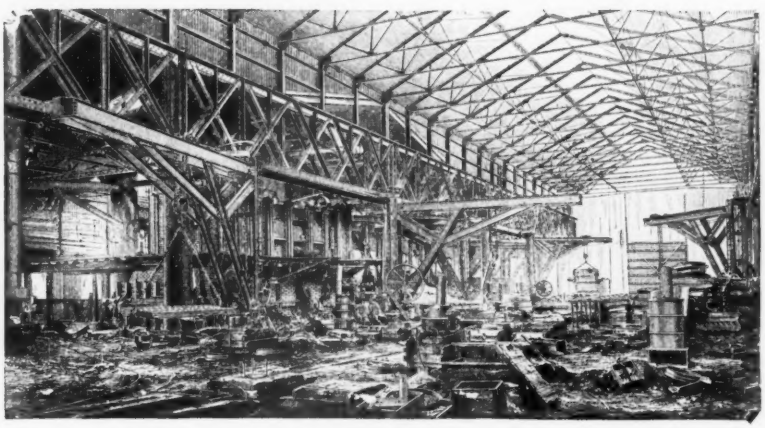
CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



The above illustration taken direct from a photograph, shows the interior of an Iron Foundry designed and built by us for the Farrel Foundry & Machine Company, at Ansonia, Conn. The building is 129 feet in width by 302 feet in length. The wings are 30 feet and 43 feet, respectively, and the central portion is 56 feet in width. The central portion of the building is controlled by a hydraulic traveling crane, with a travel the full length of the building, and is also arranged with jib cranes for delivering material from the traveling crane to the cranes in the wing trusses.

Office and Works, - - EAST BERLIN, CONN.

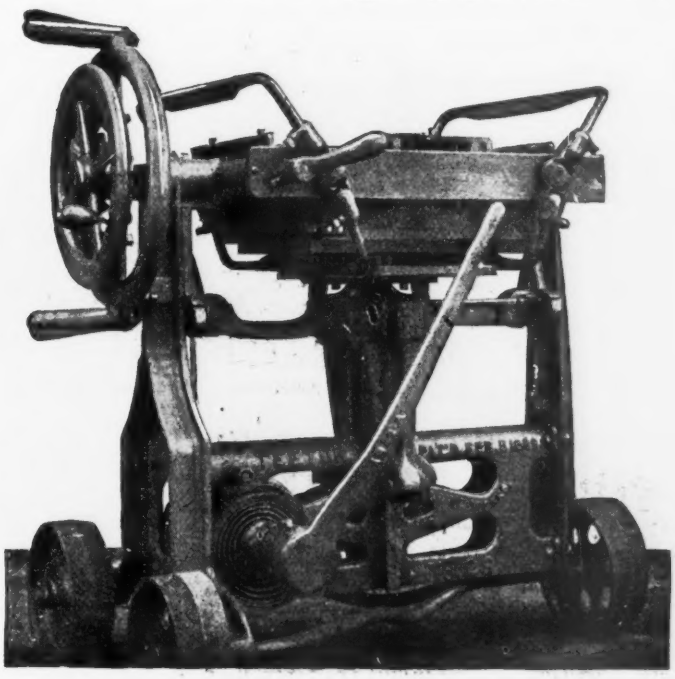
SEND FOR ILLUSTRATED CATALOGUE.

No Stripping Plates

Required when you use a

"TEETOR"

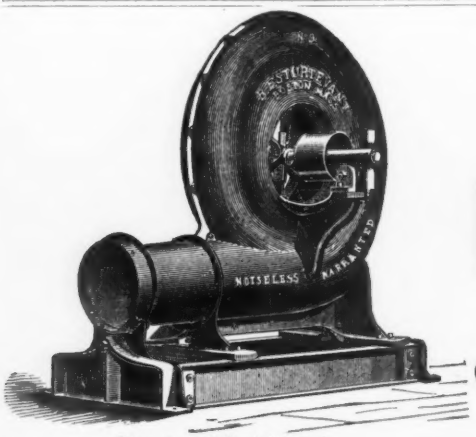
A MONEY SAVER.



A MONEY EARNER.

THE NEW TEETOR possesses many points of advantage over all other styles, and is the most convenient and easiest operated machine on the market.

TEETOR MOLDING MACHINE CO. INDIANAPOLIS. IND.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

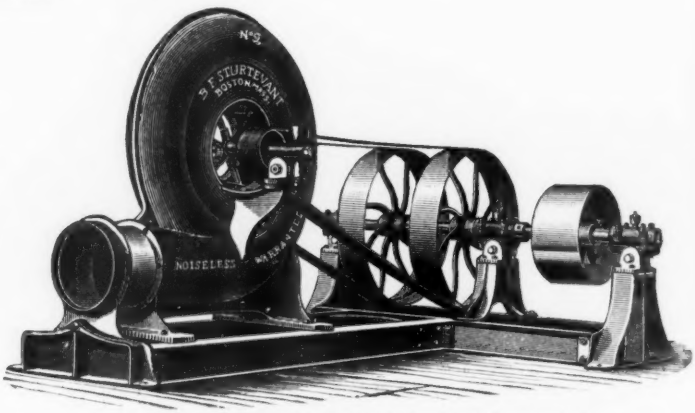
—FOR—

Cupola Furnaces and Forge Fires.

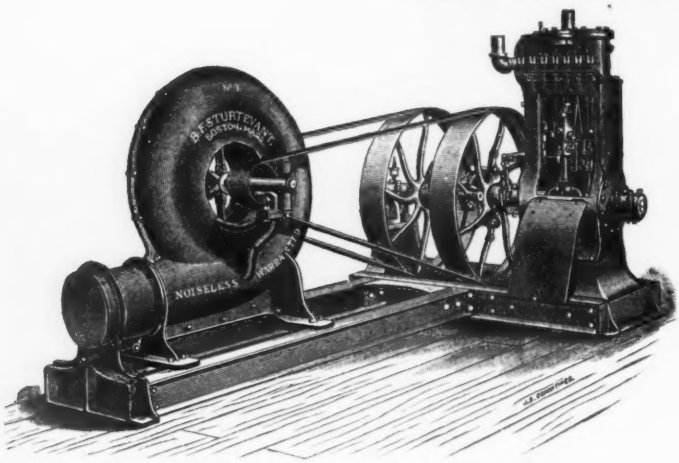
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

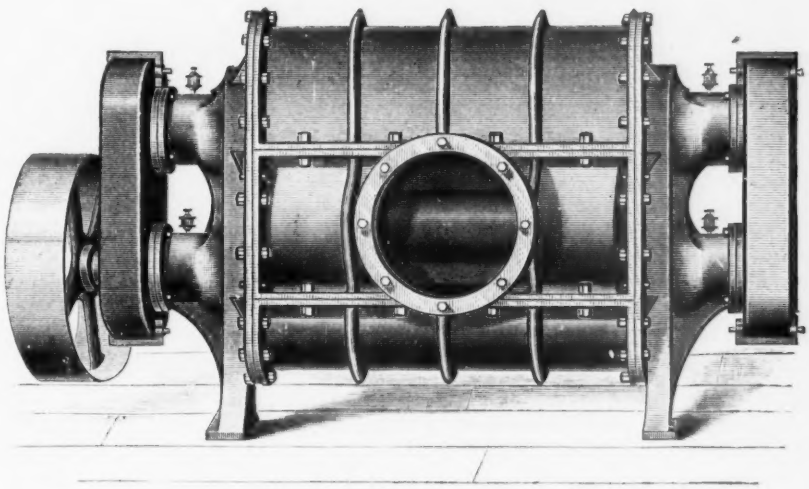
BOSTON, MASS.

131 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Green Rotary Pressure Blower

GIVES THE MOST AIR FOR A $.



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

GIVES THE MOST AIR FOR A $.

SEND FOR CATALOGUE.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

P.G.COCHRAN President
JNO.H.WURTZ Secretary
J.R.LAUGHREY Treasurer
J.S.NEWMYER Manager
COAL MINES & COKE WORKS
On Pittsburg & Lake Erie Railroad
GENERAL OFFICE
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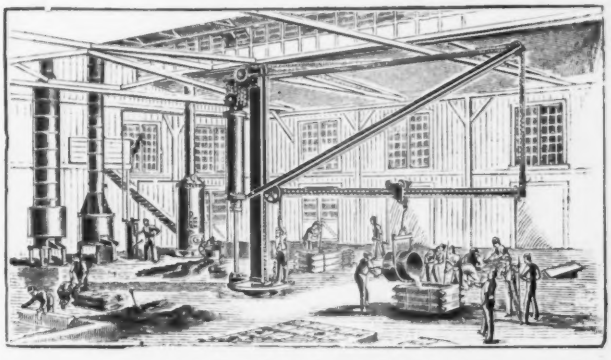
SALES OFFICE
Pittsburg Pa
WASHINGTON COAL & COKE CO.
CAPITAL PAID UP $250,000.00
Youghiogheny Coal · High Grade Coke
INDIVIDUAL CARS.
DAWSON, PA.
N.P.HYNDMAN, Sales Agent
PITTSBURG PA

"Three Times for Luck!"

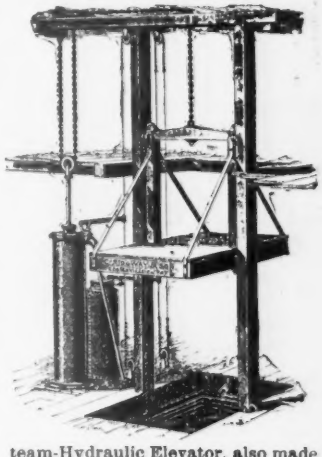
It was just this way:

THE CLEVELAND ROLLING MILL CO., of Cleveland, Ohio, some time ago got one of these machines. Didn't have it a-going long before they cried, "Send us another," and now here they come again and we begin the New Year by shipping them the Third one. "Three Times for Luck!"



5-ton Steam-Hydraulic Crane in a Foundry.

THE CRESCENT STEEL CO., of Pittsburg Pa.—guess you know 'em—first got a 3 ton machine to take the place of the ordinary hydraulic. No sooner got it a-going than they were quickly after a 5-ton one. And now they begin the New Year by saying, "Now, Ridgway, send us a ten-ton one." "Three Times for Luck!"



team-Hydraulic Elevator, also made direct acting with cylinder under platform.

And so it goes. We merely mention these two big concerns because they happen to be the latest cases. We have a list of such establishments who multiply Ridgway Cranes as long as your arm. Why do they all double up so? Why is it if an establishment gets one machine they keep a-crying, "More, more, more!" Say brother, why is it?

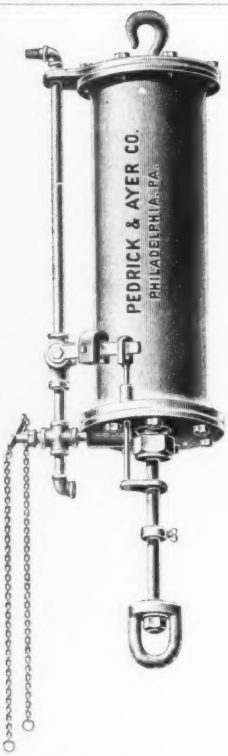
If you are interested in having your plant, whether it be steel works, rolling mill, blast furnace or foundry, or what not, make a good showing during the coming year, get the Ridgway Steam Hydraulic outfit. It don't cost much and will make and save money for you hand over fist.

Maybe you don't believe it on our say so, but here are two concerns that can tell you about it, and we can refer you to dozens of others. If we can just succeed somehow or other in getting one machine into your establishment the game will be won, other orders will roll in of their own accord. If you are a wise man you will at least investigate.

"PLEASE TAKE THE ELEVATOR."

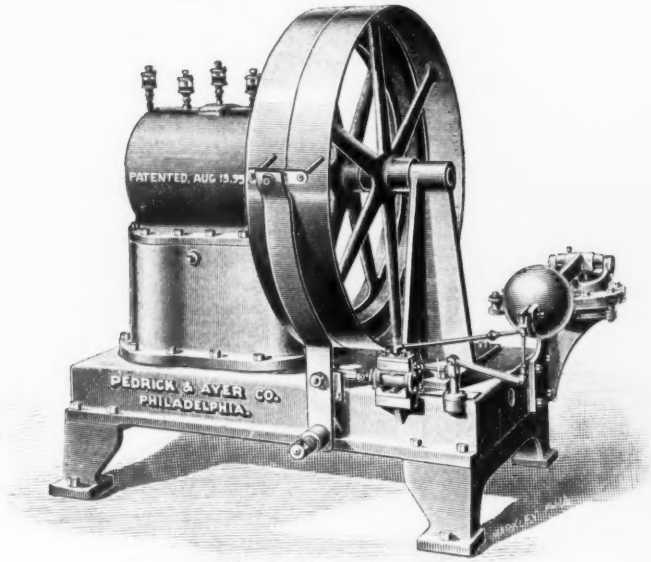
Decidedly the Best there is for Foundries, Steel Works and the like.

CRAIG RIDGWAY & SON, COATESVILLE, PA.



Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.



Straight Lift Hoist.

Built in two sizes, Nos. 1 and 2.

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11x 6 6x 6	100-160	32- 50	2-3½	40x5	2875 lbs.	60x40	Parian
2	1·x10, 8x10	90-120	90-140	9-15	60x6	5370 lbs.	76x60	Parish

HORIZONTAL HOIST.

PAT. SEPT 4TH 1894.

AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

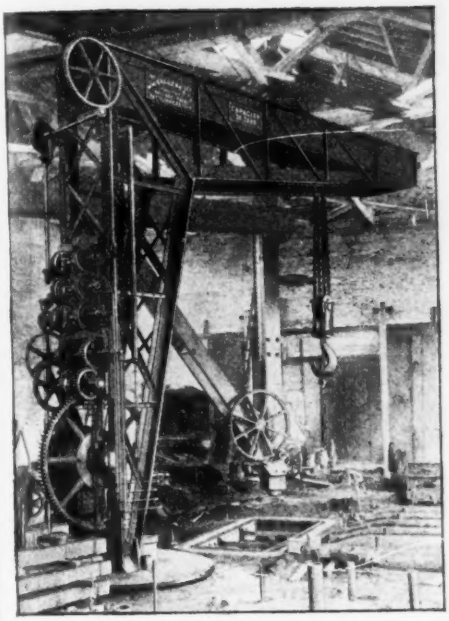
PEDRICK & AYER CO.

SPRING GARDEN STATION, PHILADELPHIA, PA.

William Sellers & Co., Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY



In connection with our Machine Tool Business, we conduct a large foundry where practical tests are continually made of new labor-saving devices. The manufacture of

IMPROVED FOUNDRY CRANES

has become an important feature.

The accompanying illustration shows a quick-acting 30-ton Steam Jib-Crane, erected in the foundry of J. Morton Poole Co., Wilmington, Del., superceding old wooden cranes, one of which appears in the background.

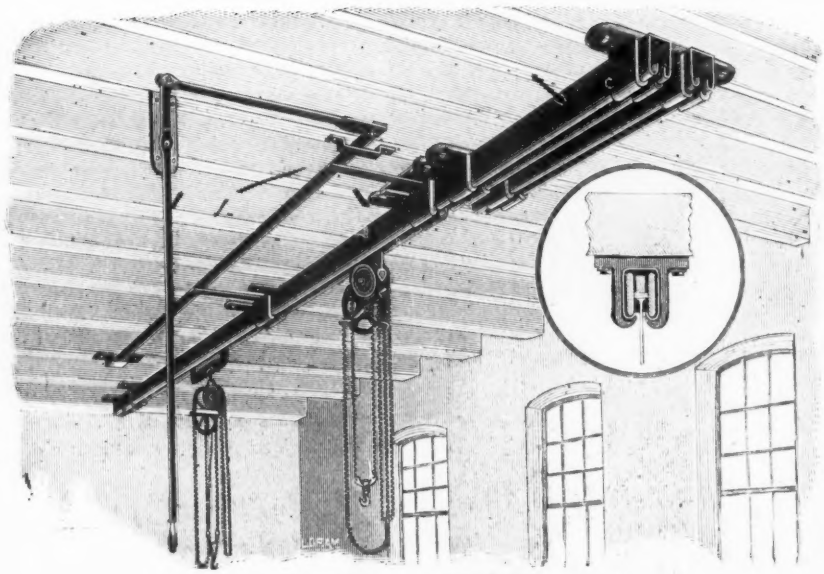
This crane is driven by independent 8" x 8" engines. The platform levers are near the floor. The effective radius of hook is 23 feet.

In future issues of this magazine, we will show illustrations of Jib and Traveling Cranes operated by electric motors.

Centrifugal Sand Mixer

Since the introduction and favorable reception of this effective, expeditious and economical **machine for preparing sand for molds and cores** we have simplified its construction and cheapened its cost. The capacity of the machine is remarkable, being limited only by the facilities for feeding sand into the hopper. Two men will easily shovel 5 tons an hour into the machine.

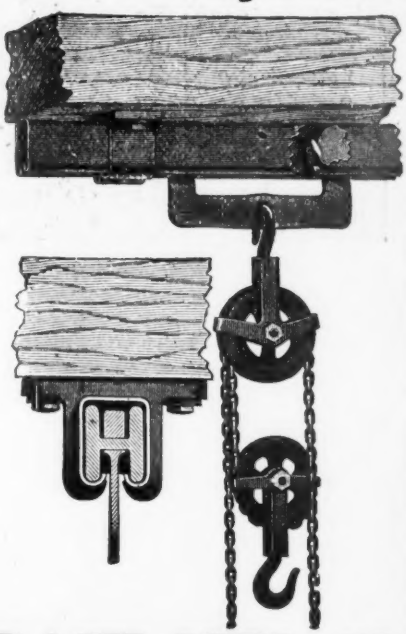
The qualities of "toughness" and "porosity" are materially improved by this process of preparing molding sand.



THE PATENT

Overhead Trolley Track System

Is the coming improvement in the iron foundries of this country and in many cases can be made to pay for itself in a few months.



Just the thing for

Carrying Iron from Cupola to Floors.
Carrying Castings from Floors to Cleaning Rooms. . . . .
Lifting, Rolling or Moving Flasks. .

All who have adopted this system have expressed themselves as being delighted with it.

Write us for Circulars, Estimates and Full Particulars.

COBURN TROLLEY TRACK MFG. CO.

HOLYOKE, MASS.

Over
10,000
in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries

In addition to 400 Railroads and over 300 Contractors.

ROSS-MEEHAN FOUNDRY CO.,
CHATTANOOGA, TENN., May 5, '96.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensible to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.

EDWARD ROBINSON, Sole Proprietor.

MENTION THE FOUNDRY.

44-46 WASHINGTON STREET, NEW YORK.

DIRECTORY OF LEADING PIG IRON DEALERS.

HUCH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

HENRY H. ADAMS & CO.

(Incorporated)

PIG IRON

Sole Agents for the Celebrated "NORWAY," for combined Strength and Softness.

177 Broadway,
NEW YORK CITY, N. Y.

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS,

Agencies,

Chicago, Detroit, New York,
Philadelphia.

THE DOMHOFF & JOYCE CO.

PIG IRON-COKE.

CINCINNATI.

CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

PICKANDS, BROWN & CO.,

Manufacturers, Importers and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO,

BUFFALO,

PHILADELPHIA, NEW YORK,

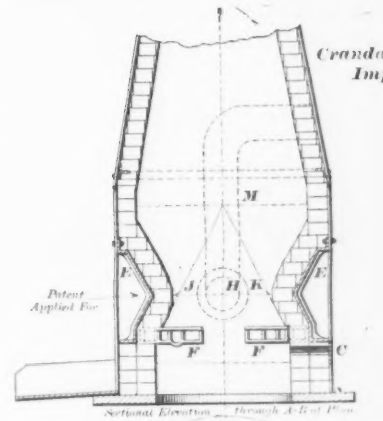
ST. LOUIS

"Eureka"

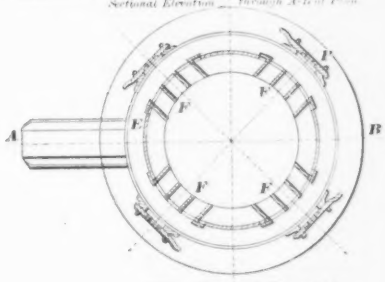
We know what it means and are satisfied it is correct.

...WHAT?

The shape shown in cut of course. We have experimented and are sure we are right. If you give the **Crandall Cupola** a trial you will fully agree with us on this point. We can furnish the complete cupola, or the lower section, which can be attached to almost any existing cupola, and by so doing make a great improvement over your present method of melting, as we penetrate the center of cupola with our blast, at the same time having a very large melting zone, shown at M.



Crandall Cupola, Improved



Plan through Tuyeres

- Cupola Furnaces
- Blowers
- Cranes
- Compressors
- Hoists
- Elevators
- Foundry and Core Oven Cars
- Ladles
- Reservoirs
- Tumbling Mills
- Core Ovens
- Sand Sifters
- Brass Furnaces
- Testing Machines
- Trolley Tracks
- Foundry Lights
- Flasks
- Fire Brick
- Fire Clay
- Molding Sand

With straight walls nearly one-half the volume of blast escapes up the sides, and with it a great number of units of heat, with irregular walls the blast must penetrate the fuel as it lays very close at incline below melting point, consequently it passes through the fuel and gives the necessary combustion. What you are all looking for is the greatest amount of heat with the least amount of blast, fuel and brick, that is what we can give you.

We have everything used in a Foundry.

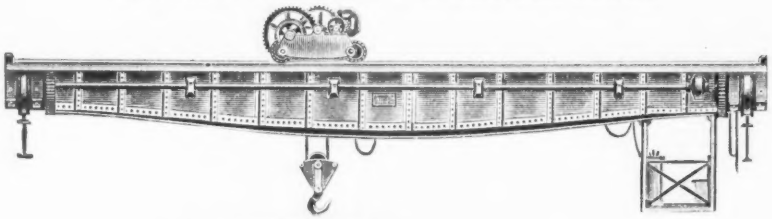
The Foundry Outfitting Co.

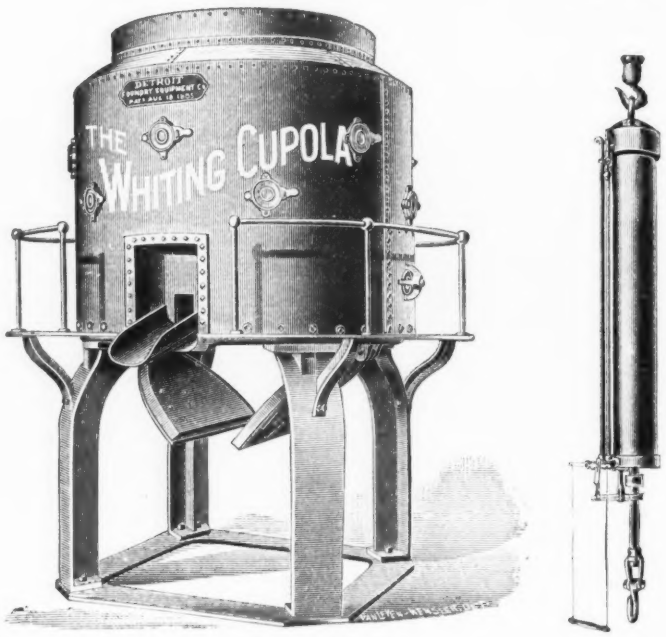
DETROIT, MICH.

Whiting Foundry Equipment Co.

HARVEY, ILL. (Chicago Suburb.)

CHICAGO OFFICE—1522 MONADNOCK BLOCK.





Manufacturers of

CRANES, CUPOLAS, AIR HOISTS, LADLES,

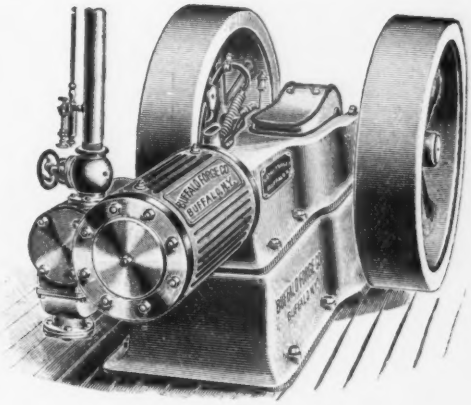
TUMBLERS, TRUCKS, TURNTABLES,
FLASKS, Etc.

COMPLETE FOUNDRY PLANTS. Send for Catalogue.

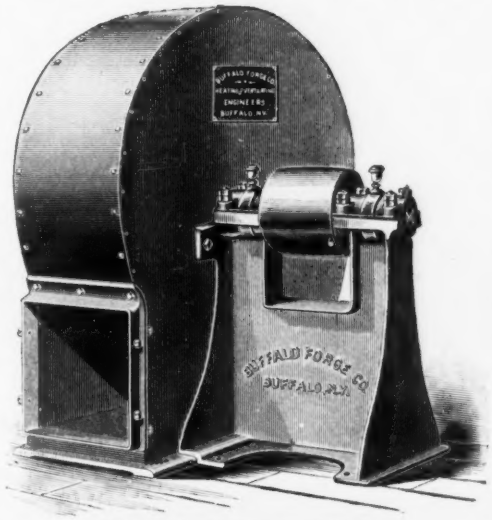
CUPOLA BLOWER.

For the latest development in Cupola Blower construction and application, see BUFFALO FORGE CO.'S 1896 Sectional Catalogue, "America's Best, the World's Standard."

BUFFALO FORGE CO.'S Automatic Cut-off Engine, Horizontal and Upright types for Electric Lighting and Power purposes, direct connected or belted. 1896 Sectional Catalogue furnishes full details.



CLASS "A" HORIZONTAL.



TUMBLING BARREL EXHAUSTER.

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment. Send for details.

BUFFALO FORGE CO.,
BUFFALO, N. Y., U. S. A.

CHICAGO, 22-24 W. Randolph St. NEW YORK, 26 Cortlandt St.

Syracuse Steel Wheelbarrows

Foundry Barrow

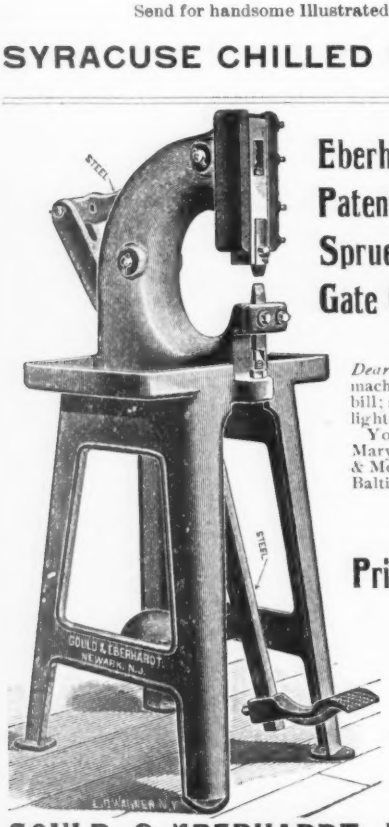
TEN NOS.

Nos. 32-48 all dump forward and stand on end, saving room in storage.

Trays of best quality, smoothly lapped and riveted. Edges strengthened by steel band. Legs with renewable steel shoes. Patent steel wheel with staggered spokes. Heavily braced throughout. The most durable and easily handled barrow made. Steel charging and other barrows in large variety.

Send for handsome Illustrated Barrow and Truck Catalogue, with Discount Sheet, to

SYRACUSE CHILLED PLOW CO., - SYRACUSE, N. Y.



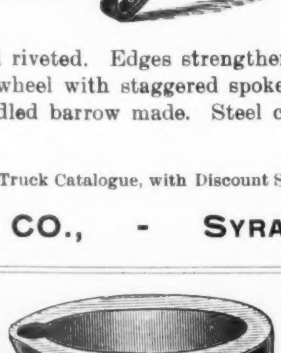
Eberhardt's Patented Sprue or Gate Cutter

Dear Sir:—The machine fills the bill; am just delighted with it. Yours truly, Maryland Brass & Metal Works, Baltimore, Md.

Price Low

Send to

GOULD & EBERHARDT, NEWARK, N. J.



Crucibles AND Plumbago

Progress is the order of the day and our improvements have been so marked that we have attained as high as 90 heats, as per testimonial attached.

New Orleans, La., Feb. 13, 1896.

HUSSMAN CRUCIBLE CO., St. Louis, Mo.:

Dear Sirs—Kindly send me four (4) No. 70 and four (4) No. 80 Crucibles. I think I have established a record for Plumbago Crucibles. I took out an even 90 heats from one of your No 70 Pots. Trusting you will give this order your immediate attention, I am,

Very truly yours,
F. H. KORETKE,
922 Magazine Street, New Orleans, La.

CEYLON PLUMBAGO is the best for Facings, Lubricant, etc., and our prices the lowest.

Hussman Crucible Co.

ST. LOUIS, MO.

BUYERS' DIRECTORY.

ALUMINUM.
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Ingersoll-Sergeant Drill Co., New York, N. Y.
Whiting Foundry Equipment Co., Harvey, Ill.
Pedrick & Ayer, Philadelphia, Pa.

AIR COMPRESSORS.
Pedrick & Ayer, Philadelphia, Pa.

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Connersville Blower Co., Connersville, Ind.
Root, P. H. & F. M. Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass.
Wilbraham Baker Blower Co., Philadelphia, Pa.

BRASS FOUNDERS' SUPPLIES.
Brass Founders' Supply Co., Newark, N. J.

BRONZES.
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CHARCOAL.
Springfield Facing Co., Springfield, Mass.

COKE.
Washington Coal and Coke Co., 7 Wood St., Pittsburg, Pa.

CORE COMPOUNDS.
Vreeland Tompkins, Jersey City, N. J.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
Foundry Outfitting Co., Detroit, Mich.
Whiting Foundry Equipment Co., Chicago.

CRANES.
Addyston Pipe and Steel Co., Cincinnati, O.
Craig, Ridgway & Son, Coatesville, Pa.
Wm. Sellers Co., Philadelphia, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

CRUCIBLES.
Joseph Dixon Crucible Co., Jersey City, N. J.
Hussman Crucible Co., St. Louis, Mo.
McCullough-Dalzell Co., Pittsburg, Pa.
Taylor Crucible Co. oRbert J., Philadelphia, Pa.

CUPOLAS.
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

ELEVATORS.
Ridgway & Son, Craig, Coatesville, Pa.

FIRE-BRICK.
Brooklyn Fire Brick Works, Brooklyn, N. Y.
Obermayer Company, The S., Cincinnati, O.
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whitehead Bros. Co., New York.
Whitehead Bros .Co., New York.

FLASKS.
Diamond Clamp & Flask Co., Richmond, Ind.
Brass Founders' Supply Co., Newark, N. J.

FLEXIBLE SHAFTS.
Stow Mfg. Co., Binghamton, N. Y.
Chicago Flexible Shaft Co., Chicago.

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Obermayer Company, The S., Cincinnati, O.
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Whitehead Bros. Co., New York.
Whiting Foundry Equipment Co., Harvey, Ill.

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Obermayer Company, The S., Cincinnati, O.
Paxson & Co., J. W., Philadelphia, Pa.
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If you don't you are not keeping up with the times.

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THE

Ingersoll-Sergeant Drill Co.

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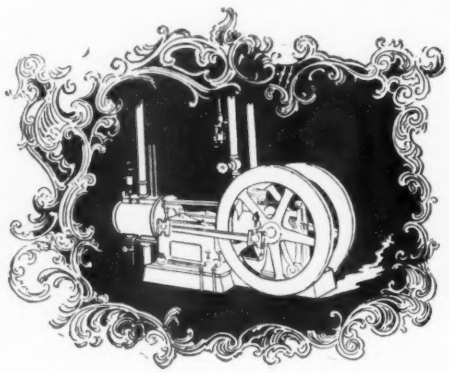

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"SMOOTH ON" IRON COMPOUND CASTINGS

Will stop a hole steam tight or Repair a defect in Castings and often save 100 times its cost in time and money in repairing defects in Cast Iron Patterns or other Castings . . . . . .

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FURNACES
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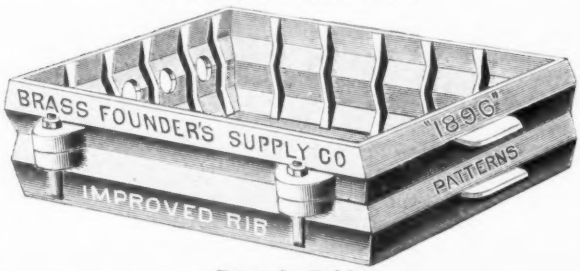

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ORDER THE RIBBED IT IS BEST!

Stronger and Cheaper than any others.

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The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

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Single subscription to all parts of the United States and Canada, $1 per annum.
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WE MAKE CRANES

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With our special tools we make **Flange Pipe** at low cost. Let us name you prices when you require . . . .

HUB OR FLANGE PIPE AND FITTINGS.

We may be able to supply them to you at less than your cost. . . . . .

The Addyston Pipe and Steel Co.

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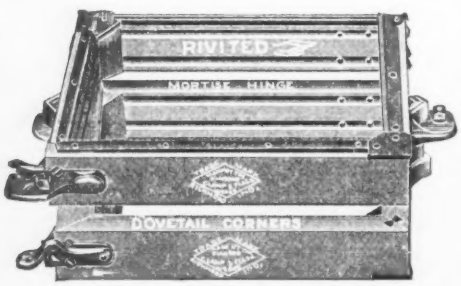

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Is the lightest, strongest and cheapest flask on the market. Your choice in style of latches. Your order at the depot in one hour.

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Look at the Wood We Burn into . . **CHARCOAL**

NO WONDER OUR

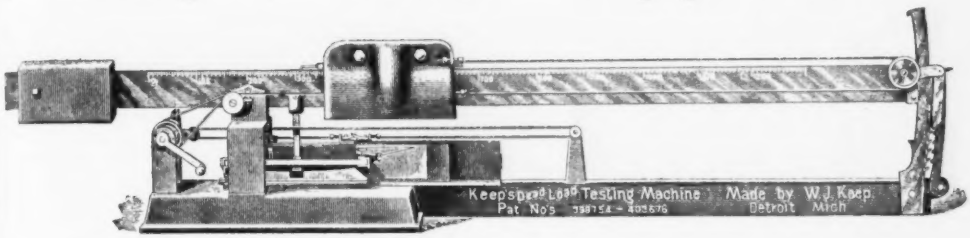
CHARCOAL FACING

is used in so many Brass and Stove Foundries.

LET US TALK IT OVER WITH YOU.

Springfield Facing Co. SPRINGFIELD MASS.

"Keep's Test" Apparatus.



HERE IS WHAT ONE LARGE CONCERN SAYS:-IT HAS PAID THEM, WHY NOT YOU?

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To SAVE MONEY IN YOUR OWN FOUNDRY, ADDRESS **W. J. KEEP, Detroit, Mich.**

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MANUFACTURERS OF

Flexible Shafts

UNDER AN

Improved Process,

insuring great strength and increased durability.

WARRANTED THE BEST

Superior Shafts for all purposes. Also special and standard

Tools and Appliances

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Largest Facilities
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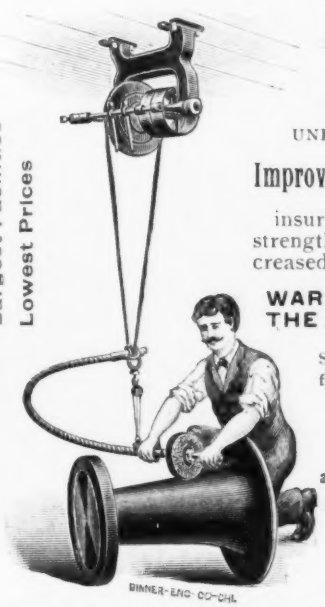

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CUPOLA BLOCKS, FIRE SAND, FIRE CLAY, FIRE MORTAR, KAOLIN

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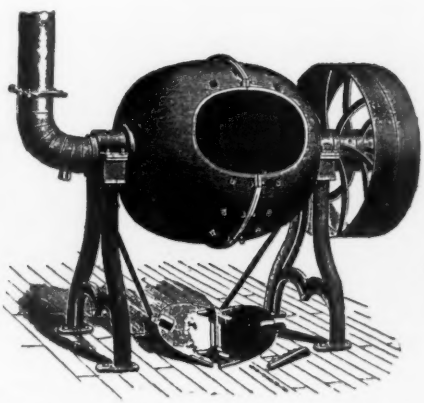
EXHAUST TUMBLING BARREL



The Stover Egg Shaped Barrel does double the work of any other with less noise and power.

It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

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THE GOBEILLE PATTERN CO. CLEVELAND, O.

FARWELL'S MOULDING MACHINES Send for Catalogue

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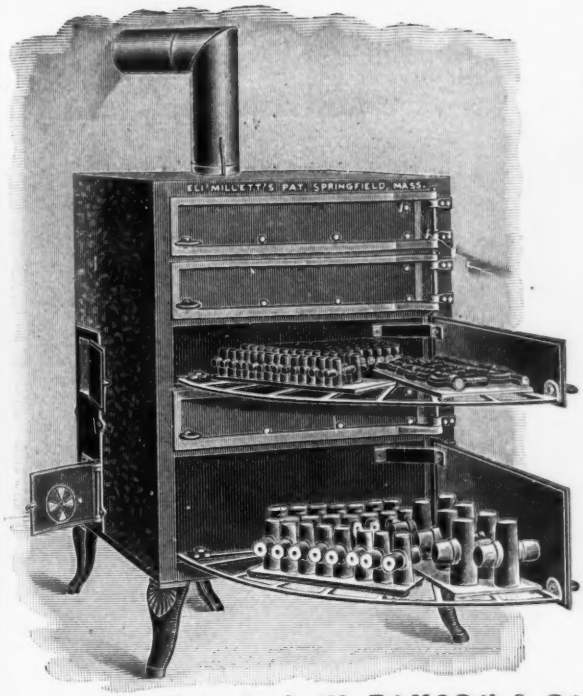

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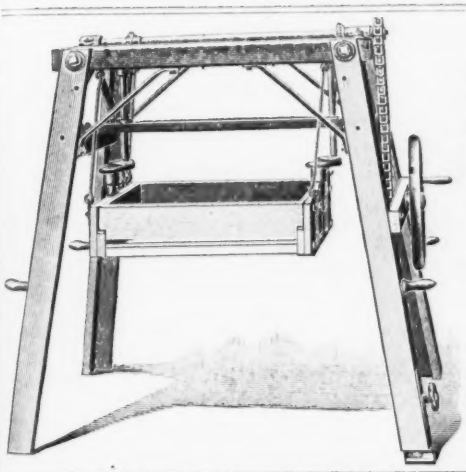

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This is the Best, Simplest, Cheapest, Most Durable and Most Easily Operated Sand Riddling Machine made.

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TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

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FOR ALL PURPOSES.

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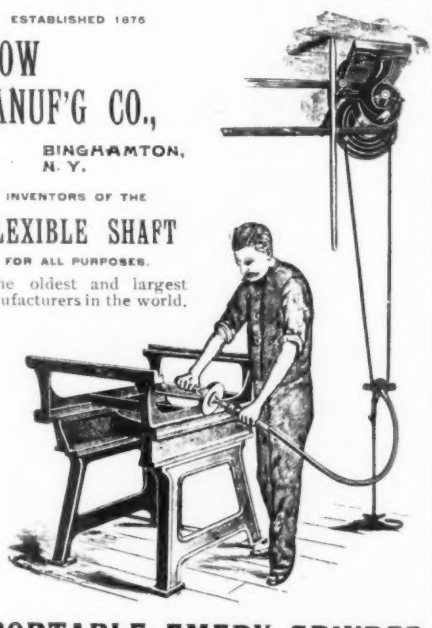

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as to

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Dixon's Crucibles are Standard all over the **GLOBE.**
Dixon's Crucibles are used in every country on the Globe where metals are melted.
Dixon's Crucibles have the highest records for **HEATS.**
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BEST RESULTS WITH THE LEAST COAL.

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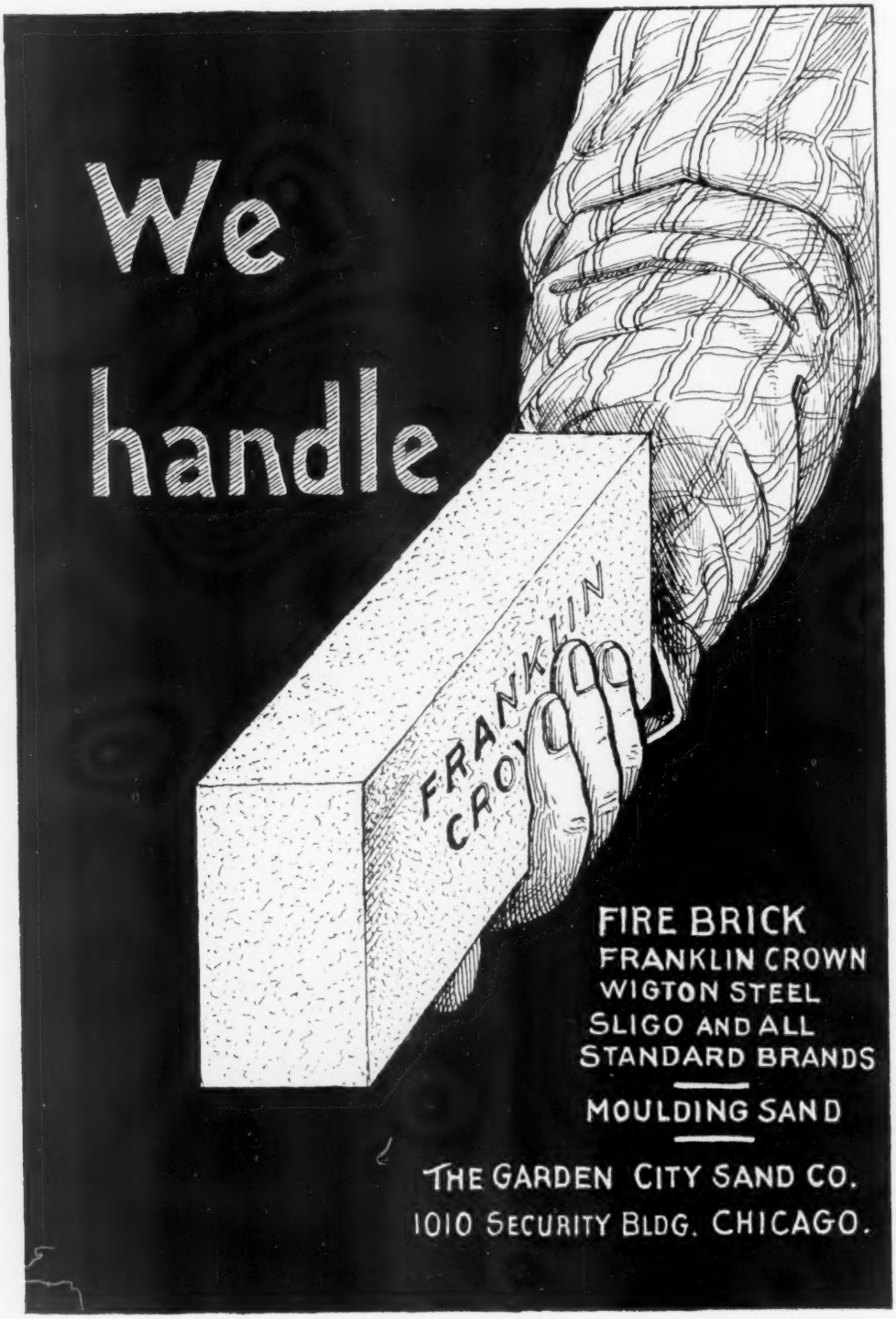
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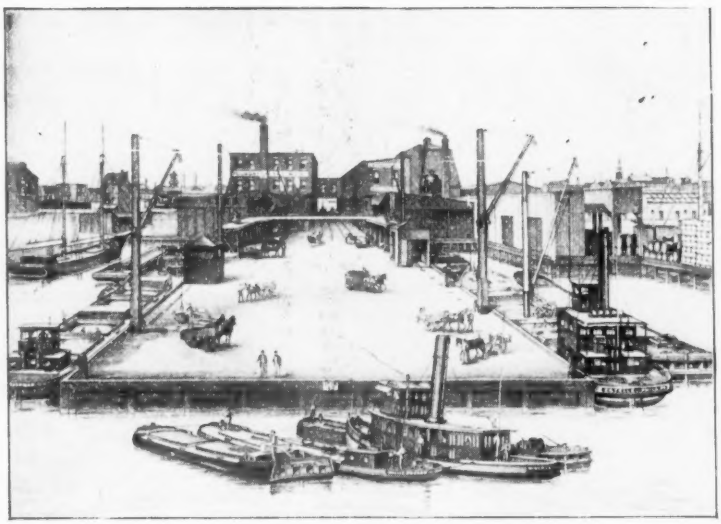

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DEALERS IN

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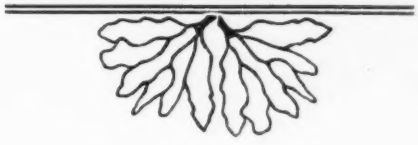

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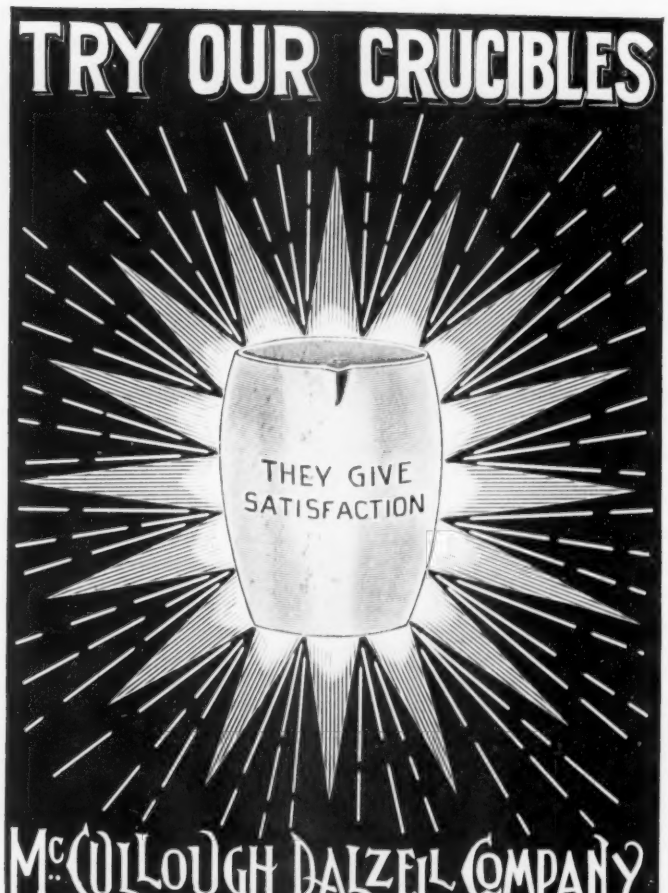
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THEY GIVE SATISFACTION
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36 ST. & A.V. RY. PITTSBURG PA.

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We make All Sizes, from 8 oz. to 2 ton Capacity.

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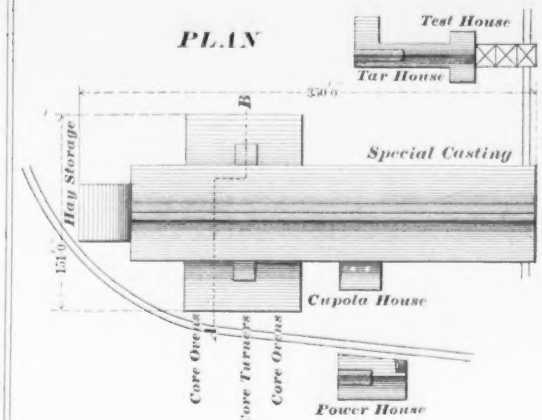

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For J. B. Clow & Sons,
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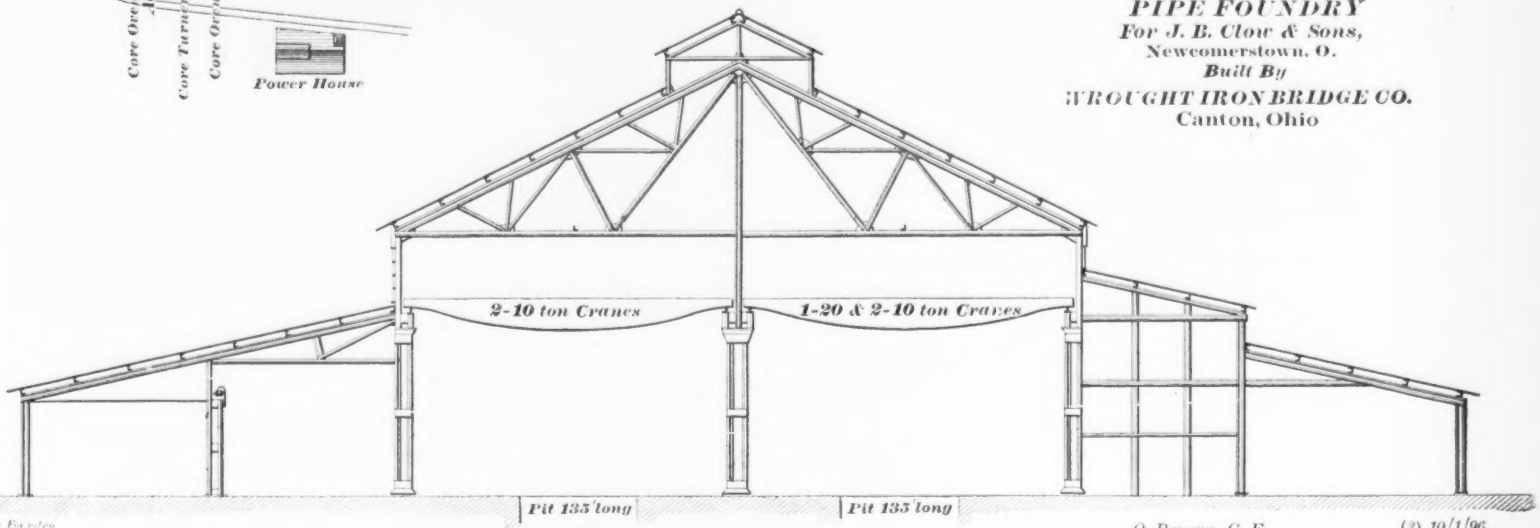
WROUGHT IRON BRIDGE CO.
Canton, Ohio



Cross Section on Line A-B

O. Benson, C. E.
Structural Engineer

(2) 10/1/96

We design and construct Foundries, Machine Shops and similar structures. Also Roofs, Turntables and Bridges of every description.

Principal Office and Works at Canton, O.
Branch Offices at New York, Chicago, Indianapolis and Kansas City.

CHAS. M. JARVIS, President and Chief Engineer.
GEO. H. SAGE, Secretary

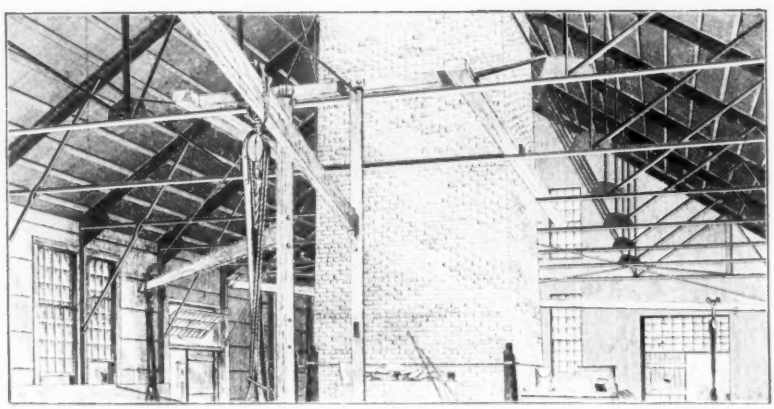
BURR K. FIELD, Vice-President
F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



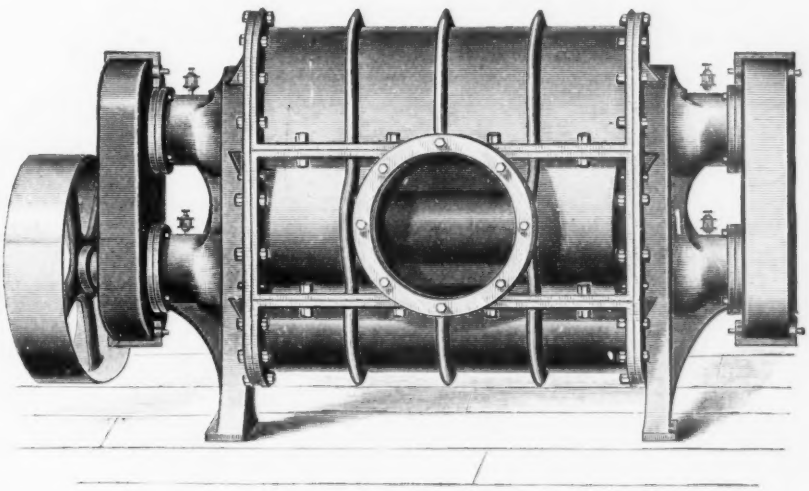
The above illustration is taken direct from a photograph, and shows the interior construction of an iron casting shop designed and built by us for the Waterbury Brass Company, at Waterbury, Conn. The building is 52 feet in width by 110 feet in length, and built entirely of iron; that is, iron sides and iron roof. The danger from fire in a brass casting shop is very great, and a construction of this kind eliminates this danger entirely.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

The Green Rotary Pressure Blower

GIVES THE MOST AIR FOR A $.



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

GIVES THE MOST AIR FOR A $.

SEND FOR CATALOGUE.

Wilbraham Baker Blower Co.,

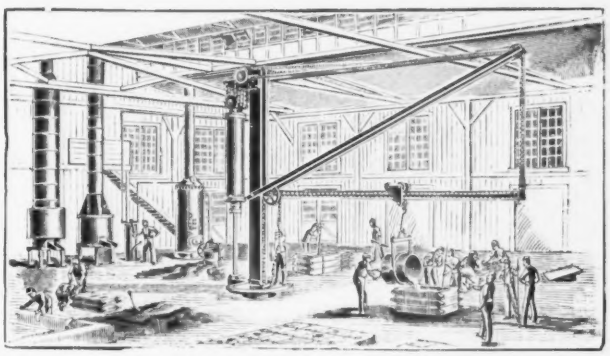
2518 Frankford Ave., PHILADELPHIA, PA.

WASHINGTON COAL & COKE CO
CAPITAL PAID UP $250,000.00
Youghiogheny Coal · High Grade Coke.
DAWSON, PA.
INDIVIDUAL CARS.
N P HYNDMAN Sales Agent
PITTSBURG PA
COAL MINES & COKE WORKS
On Pittsburg & Lake Erie Railroad
GENERAL OFFICE Dawson, Pa
SALES OFFICE Pittsburg Pa
R.G.COCHRAN, President
JNO.H.WURTZ, Secretary
J.R.LAUGHREY, Treasurer
J.B.NEWMYER, Manager

"Fools Rush in Where Angels Fear to Tread"

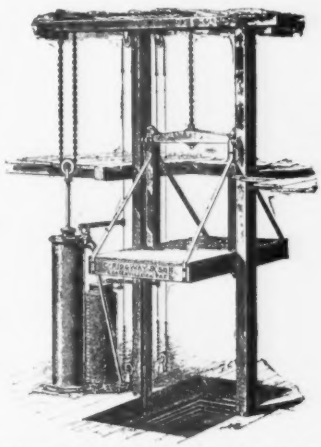
And in consequence low prices are hammered still lower. Orders are harder and harder to get and you wonder why in the world you ever learned the business anyhow, and groan "times are worse'n ever."

Well, haven't we been a telling you all the time? Here are the other fellows enlarging their plants continually, adopting every labor-saving device they can get, and they calculate on taking the orders if there are any orders a going, and you, with your old "main strength and awkwardness" equipment, are being left high and dry and feeling as blue as a postage stamp about it.



5-ton Steam-Hydraulic Crane in a Foundry.

Now you can make goods as cheaply as anyone by adopting labor-saving devices. No, the days of the little fellows are not numbered, by a jugful. But the little fellows must be awake, too. Of course it would cost you like sixty to put down a hydraulic plant, or an electric plant, or pneumatic. But here we come along with a Ridgway Steam Hydraulic and give you a better system that don't cost you one cent, mark it, not one single solitary cent. You just hook on to your existing steam supply and there you are. Why, Mr. Man, the Ridgway Cranes are simply a god-send to you! Just look at the hundreds of places where they have Ridgway Cranes and see how they are holding their own even in these trying times. You think what we say is "only advertising." Why not do a little investigating for yourself? We will give you all the names you want and you can either write or go and see them. That's the way to find out if we save money or not.



Steam-Hydraulic Elevator, also made direct acting with cylinder under platform.

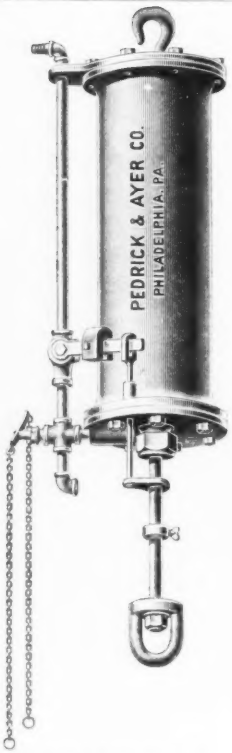
—

"PLEASE TAKE THE ELEVATOR."

Making lots of 'em, because they are the best elevators there are.

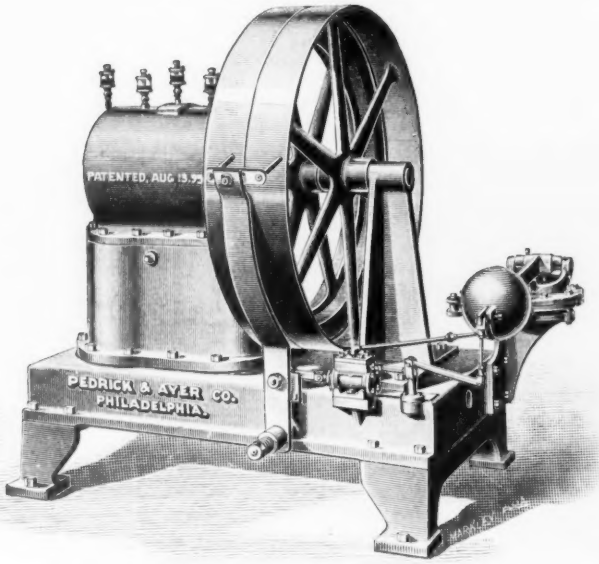
—

CRAIG RIDGWAY & SON, COATESVILLE, PA.



Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.



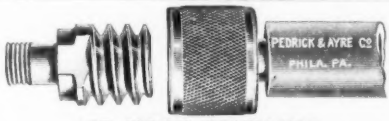
Straight Lift Hoist.

Built in two sizes, Nos. 1 and 2.

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11x 6 6x 6	100-100	32- 50	2-3½	40x5	2875 lbs.	60x40	Parian
2	1 x10 8x10	90-120	90-120	9-15	60x6	5370 lbs.	76x60	Parish

HORIZONTAL HOIST.

PAT. SEPT 4TH 1894



AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

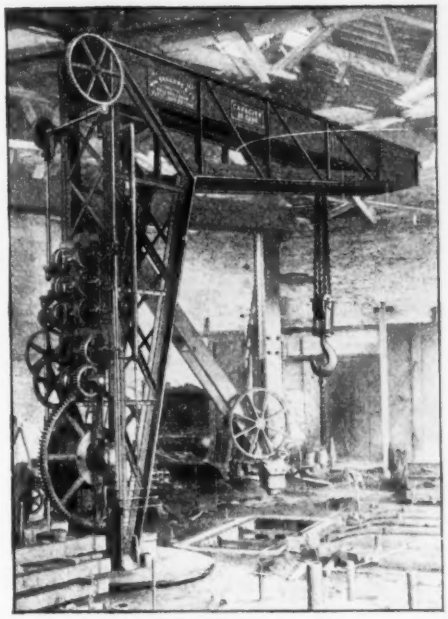
PEDRICK & AYER CO.

SPRING GARDEN STATION, PHILADELPHIA, PA.

William Sellers & Co. Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY



In connection with our Machine Tool Business, we conduct a large foundry where practical tests are continually made of new labor-saving devices. The manufacture of

IMPROVED FOUNDRY CRANES

has become an important feature.

The accompanying illustration shows a quick-acting 30-ton Steam Jib-Crane, erected in the foundry of J. Morton Poole Co., Wilmington, Del., superceding old wooden cranes, one of which appears in the background.

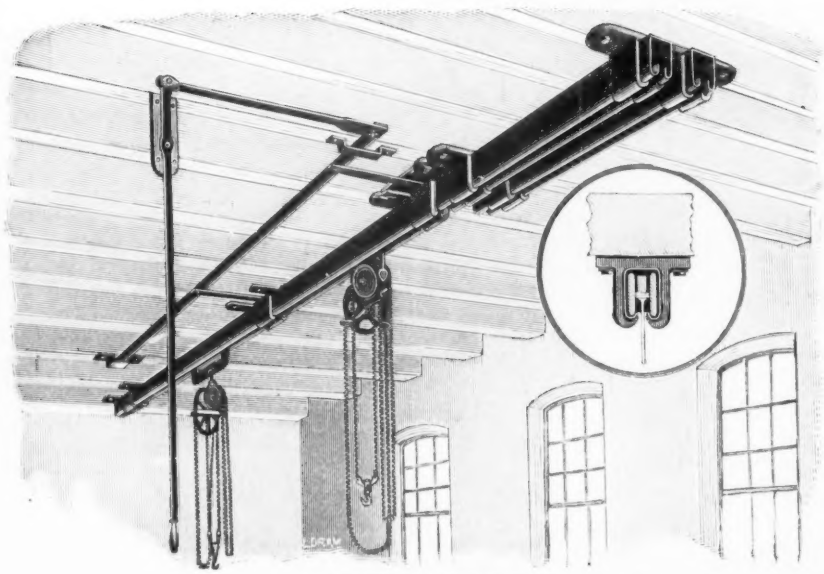
This crane is driven by independent 8" x 8" engines. The platform levers are near the floor. The effective radius of hook is 23 feet.

In future issues of this magazine, we will show illustrations of Jib and Traveling Cranes operated by electric motors.

Centrifugal Sand Mixer

Since the introduction and favorable reception of this effective, expeditious and economical **machine for preparing sand for molds and cores** we have simplified its construction and cheapened its cost. The capacity of the machine is remarkable, being limited only by the facilities for feeding sand into the hopper. Two men will easily shovel 5 tons an hour into the machine.

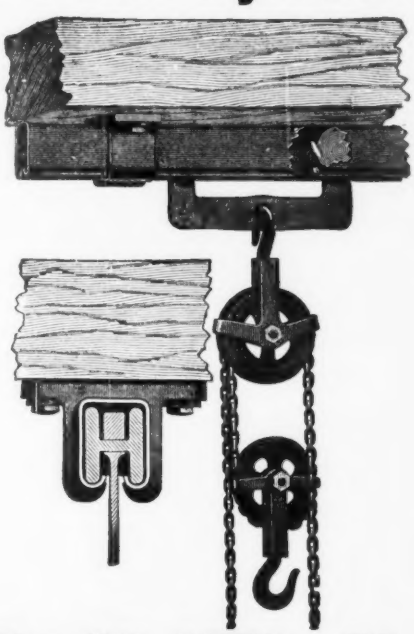
The qualities of "toughness" and "porosity" are materially improved by this process of preparing molding sand.



THE PATENT

Overhead Trolley Track System

Is the coming improvement in the iron foundries of this country and in many cases can be made to pay for itself in a few months.



Just the thing for

Carrying Iron from Cupola to Floors.
Carrying Castings from Floors to Cleaning Rooms. . . . .
Lifting, Rolling or Moving Flasks. .

All who have adopted this system have expressed themselves as being delighted with it.

Write us for Circulars, Estimates and Full Particulars.

COBURN TROLLEY TRACK MFG. CO.

HOLYOKE, MASS.

Over 10,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries

In addition to 400 Railroads and over 300 Contractors.

ROSS-MEEHAN FOUNDRY CO. }
CHATTANOOGA, TENN., May 5, '96. }

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensible to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.

EDWARD ROBINSON, Sole Proprietor.

MENTION THE FOUNDRY. **44-46 WASHINGTON STREET, NEW YORK.**

.....189?

To Foundry Publishing Co.

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Inclosed please find.....

for which send THE FOUNDRY *for one year to*

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Subscription—One Dollar per year in advance to all parts of the United States and Canada; one dollar and seventy-five cents per year to all parts of the Universal Postal Union. May be sent by express, draft, money order, registered letter or U. S. postage stamps. Single copies, 15c.

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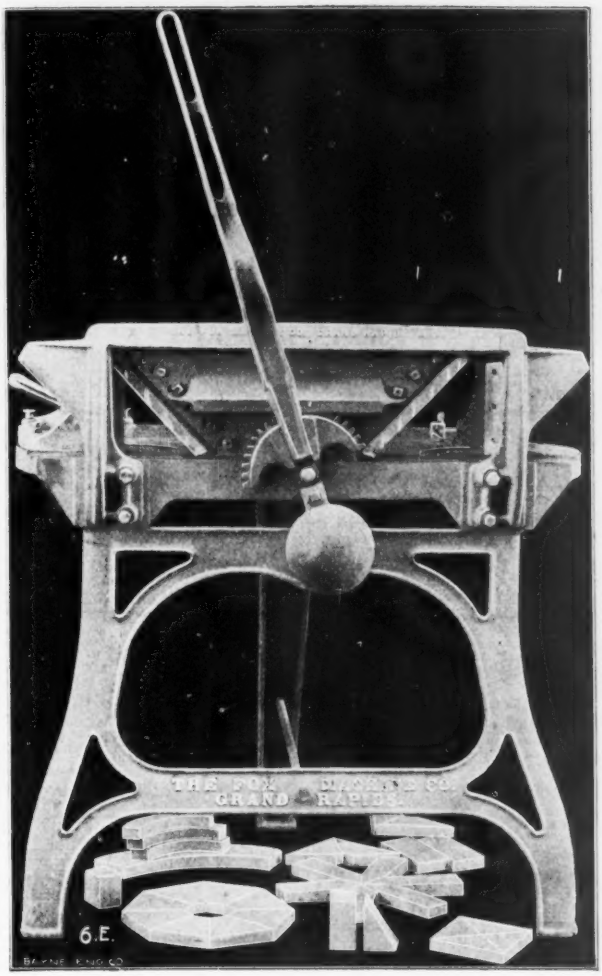
NOW, is the time

To investigate the matter of that Improved FOX UNIVERSAL TRIMMER you need so badly.

WHY NOT JUST LOOK IT UP ?



SEE WHAT WE HAVE TO OFFER !

Actually, without seeing them, you cannot appreciate the hundreds of little things that our new machines will do and you know time saved in the pattern department means **money**, and lots of it. Write us.

FOX MACHINE CO. 850 North Front Street, GRAND RAPIDS, MICH.

DIRECTORY OF LEADING PIG IRON DEALERS.

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

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PIG IRON

Sole Agents for the Celebrated "NORWAY," for combined Strength and Softness.

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CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

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PICKANDS, BROWN & CO.,

Manufacturers, Importers and Dealers in

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Rookery Building, CHICAGO.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO.

BUFFALO,

PHILADELPHIA, NEW YORK,

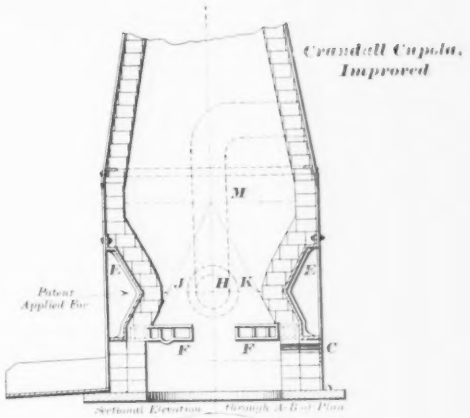
ST. LOUIS

"Eureka"

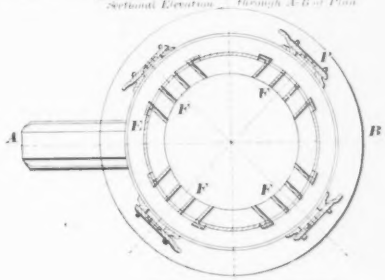
We know what it means and are satisfied it is correct.

...WHAT?

The shape shown in cut of course. We have experimented and are sure we are right. If you give the **Crandall Cupola** a trial you will fully agree with us on this point. We can furnish the complete cupola, or the lower section, which can be attached to almost any existing cupola, and by so doing make a great improvement over your present method of melting, as we penetrate the center of cupola with our blast, at the same time having a very large melting zone, shown at M.



Crandall Cupola, Improved



Plan through Tuyeres

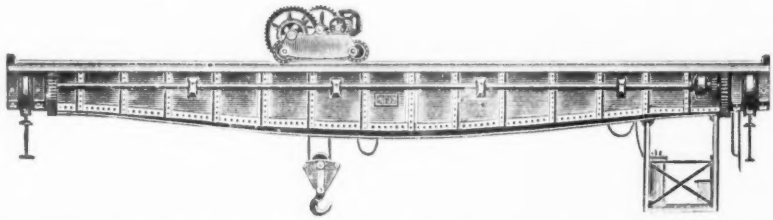
- Cupola Furnaces
- Blowers
- Cranes
- Compressors
- Hoists
- Elevators
- Foundry and Core Oven Cars
- Ladles
- Reservoirs
- Tumbling Mills
- Core Ovens
- Sand Sifters
- Brass Furnaces
- Testing Machines
- Trolley Tracks
- Foundry Lights
- Flasks
- Fire Brick
- Fire Clay
- Molding Sand

With straight walls nearly one-half the volume of blast escapes up the sides, and with it a great number of units of heat, with irregular walls the blast must penetrate the fuel as it lays very close at incline below melting point, consequently it passes through the fuel and gives the necessary combustion. What you are all looking for is the greatest amount of heat with the least amount of blast, fuel and brick, that is what we can give you.

We have everything used in a Foundry.

The Foundry Outfitting Co.

DETROIT, MICH.



CRANES Traveling or Jib, Electric, Air, Steam, Hand. All kinds. Our Crane Catalogue shows them.

AIR HOISTS A moderate priced device of this kind (that handles your product twenty times faster than hand power can do it) pays good interest on your investment. Prices on request.

THE WHITING CUPOLA

The best melter of iron. Fourteen sizes. Read our Cupola Catalogue.

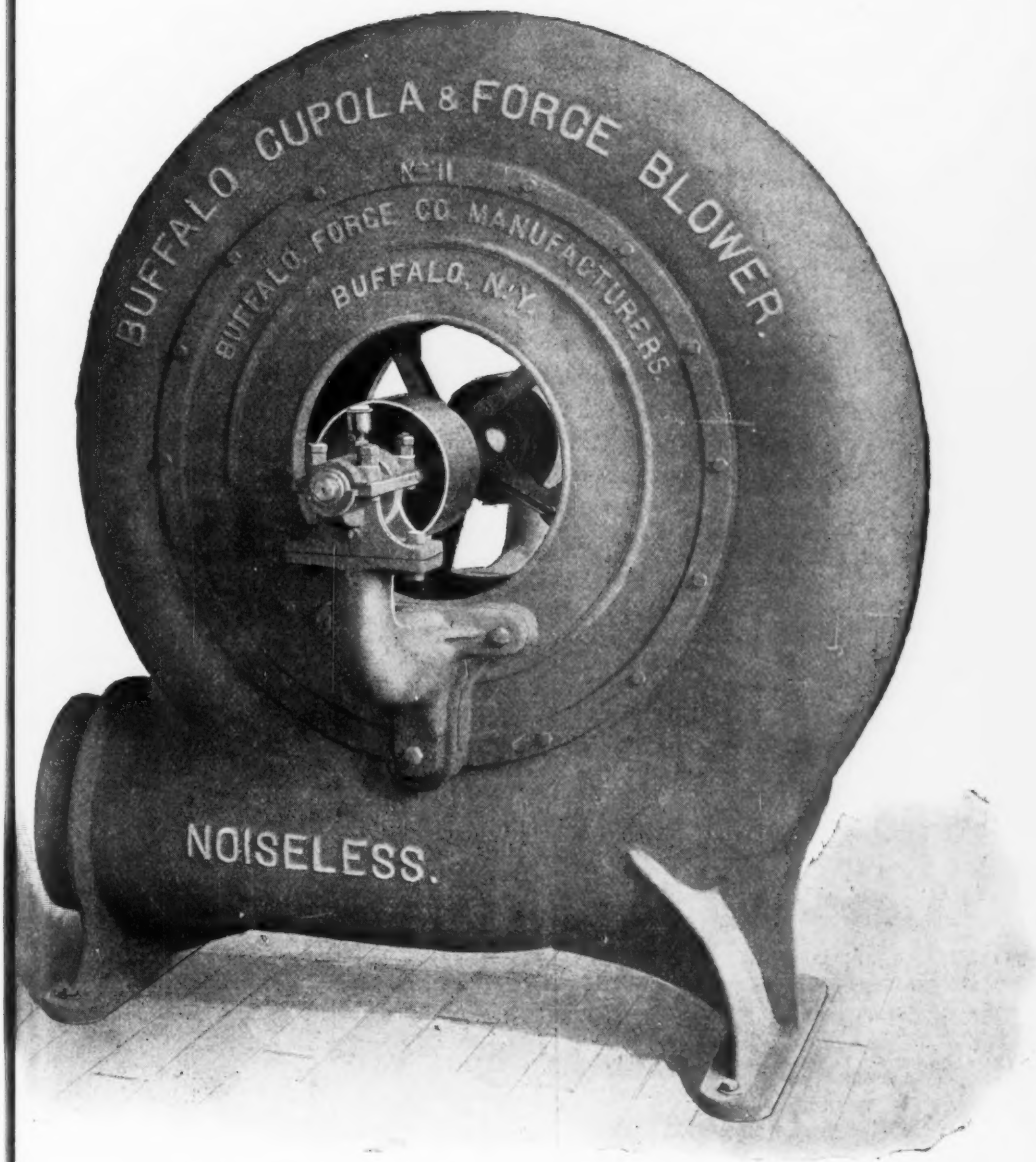
LADLES

Some new designs showing progress in the construction of these articles are illustrated in our General Catalogue.

Whiting Foundry Equipment Co.

HARVEY, ILL. (Chicago Suburb.)

Catalogue and Prices on Request.

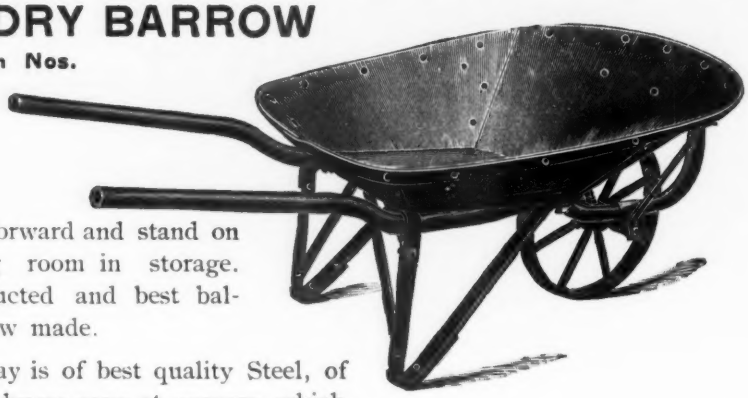


Furnished with Combined Adjustable Bed and Countershaft where desired.

"SYRACUSE" Steel Wheelbarrows

FOUNDRY BARROW

Ten Nos.



All dump forward and stand on end, saving room in storage. Best constructed and best balanced Barrow made.

The Tray is of best quality Steel, of uniform thickness save at corners, which are of double thickness, being smoothly lapped and riveted. The edges are rolled over a band of steel riveted under the flange. The Legs have renewable Steel Shoes. Patent Steel Wheel with Staggered Spokes. Heavily braced throughout. The most durable and easily handled Barrow made. Steel Charging and other Barrows in variety. Send for handsome Illustrated Barrow and Truck Catalogue No. 6

SYRACUSE CHILLED PLOW CO., Syracuse, N. Y.

Crucibles AND Plumbago

Progress is the order of the day and our improvements have been so marked that we have attained as high as 90 heats, as per testimonial attached.

New Orleans, La., Feb. 13, 1896.

HUSSMAN CRUCIBLE CO., St. Louis, Mo.:

Dear Sirs—Kindly send me four (4) No. 70 and four (4) No. 80 Crucibles. I think I have established a record for Plumbago Crucibles. I took out an even 90 heats from one of your No 70 Pots. Trusting you will give this order your immediate attention, I am,

Very truly yours,

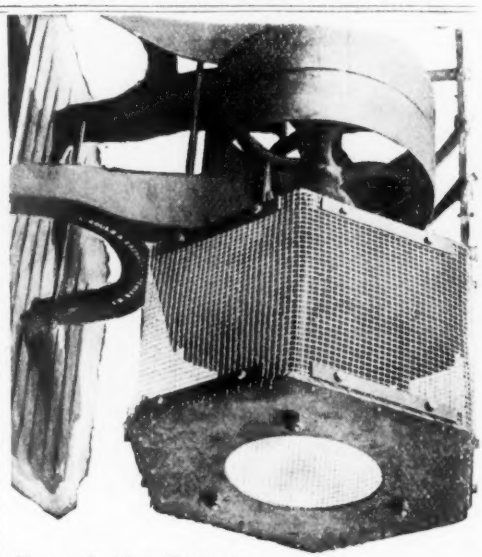
F. H. KORETKE,

922 Magazine Street, New Orleans, La.

CEYLON PLUMBAGO is the best for Facings, Lubricant, etc., and our prices the lowest.

Hussman Crucible Co.

ST. LOUIS, MO.



Messrs, Gould & Eberhardt:

NEWARK, N J. Aug. 19, 1896.

GENTLEMEN:- I have two of your Sand Sifters in use, and find them an excellent device for the preparation of Core and Facing Sand, as they sift and mix thoroughly, run with small amount of power, save the labor of one man even when run intermittently, and require but little care to keep in order. The finer seive is used as a dry Sifter and Mixer, the coarser one as a Mixer after the material is wet down. Yours truly,

S. J. MEEKER.

GOULD & EBERHARDT, NEWARK, N. J.

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Wm. Sellers Co., Philadelphia, Pa.
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McCullough-Dalzell Co., Pittsburg, Pa.
Taylor Crucible Co. oRbert J., Philadelphia, Pa.

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Whitehead Bros .Co., New York.

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Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whitehead Bros. Co., New York.
Whiting Foundry Equipment Co., Harvey, Ill.

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J. S. McCormick Company, Pittsburg, P
Obermayer Company, The S., Cincinnati, O.
Paxson & Co., J. W., Philadelphia, Pa.
Smith Foundry Supply Co., Cincinnati, Ohio.
Springfield Facing Co., Springfield, Mass.
Whitehead Bros. Co., New York.

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Berlin Iron Bridge Company, East Berlin, Conn.
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Foundry Outfitting Co., The, Detroit.
Garden City Sand Co.,Chicago, Ill.
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The Gobeille Pattern Co., Cleveland, Ohio.

PATTERN MAKERS' SUPPLIES.
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Chicago Pneumatic Tool Co., Chicago, Ill.

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Wm. Sellers & Co., Philadelphia, Pa.
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SAND BLAST MACHINERY.
Ward & Nash, Chicago, Ill.

TROLLEY TRACKS.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.

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Syracuse Chilled Plow Co., Syracuse, N. Y.

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Buchel Brush Co., New Orleans, La.

DO YOU USE AIR?

If you don't you are not keeping up with the times.

AIR IN THE SHOP SAVES MONEY.

THE

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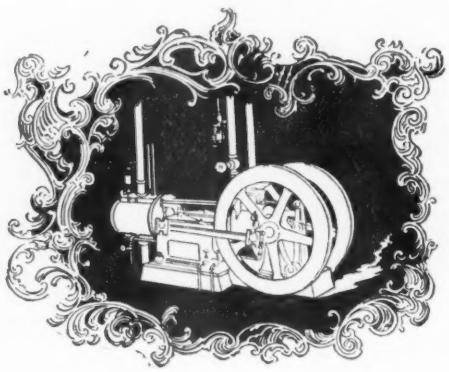

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Air Compressors OF THE Ingersoll-Sergeant Make,

ARE THE HIGHEST TYPE OF MACHINES.

ARE YOU TROUBLED

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Do you have Small Imperfections in Iron Castings?

"SMOOTH ON" IRON T COMPOUND CASTINGS

IF SO.

Tompkins' "Smooth on" Castings Iron Compound

IS WHAT YOU WANT.

VREELAND TOMPKINS, Manufacturing and Analytical Chemist . . .

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Makers of

FLASKS
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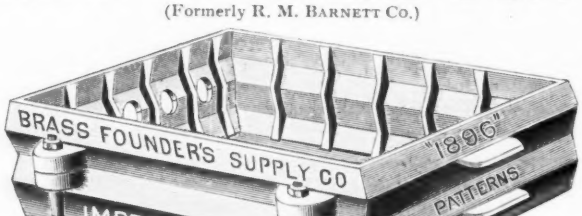
Supplies and Specialties.



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The Improved RIB, BEVELED, and Special Designs.

ORDER THE RIBBED IT IS BEST!

Stronger and Cheaper than any others.

R. M. BARNETT, J. S. MUNDY.

30-34 PROSPECT STREET, NEWARK, N. J.

Write for Catalogue.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

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Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page - -	per month, $20.00
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When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

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Copy for advertisements must be in by the 5th of the month to insure publication.

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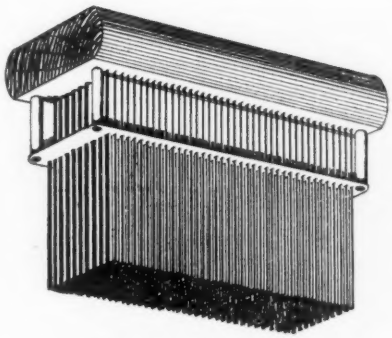
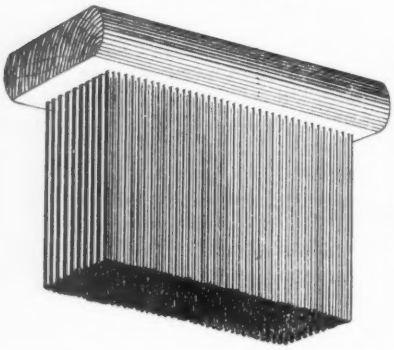
Well, it doesn't look like anything you ever saw before

A NEW DEPARTURE!
ALL MACHINE MADE!

Guaranteed Satisfaction or Money Back.
You Take No Risk.



"IRON CLAD."



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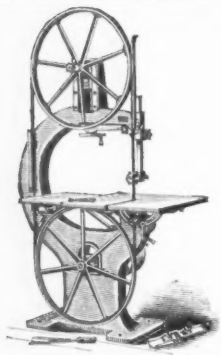

34 in. and 36 in. Band Saw Machine.

.. Complete Outfits ..

FOR

Pattern Shops

STRICTLY FIRST-CLASS TOOLS.

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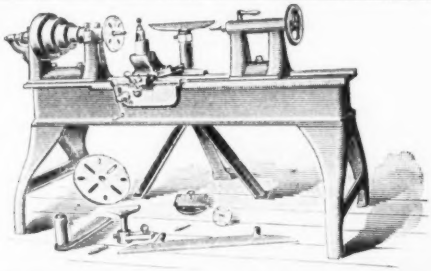
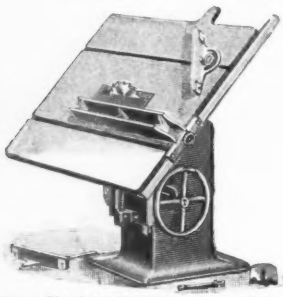


Pattern Makers' Lathes. Iron Bed with or without Carriage.

THE FRANK H. CLEMENT CO.

336 LYELL AVENUE, ROCHESTER, N. Y.



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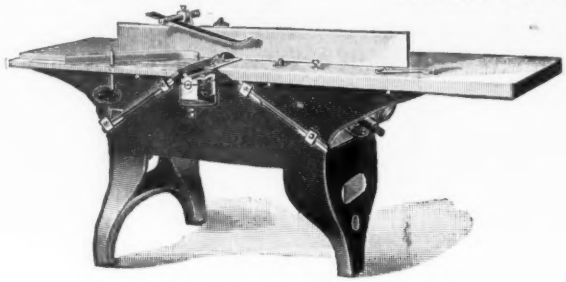

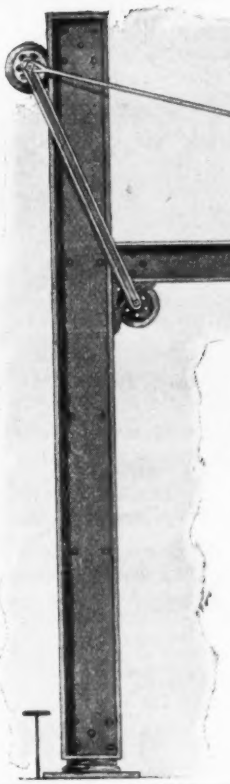

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WE MAKE CRANES

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With our special tools we make **Flange Pipe** at low cost. Let us name you prices when you require . . . .

HUB OR FLANGE PIPE AND FITTINGS.

We may be able to supply them to you at less than your cost. . . . . .

The Addyston Pipe and Steel Co.

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Look at the Wood We Burn into . . **CHARCOAL**

NO WONDER OUR

CHARCOAL FACING

is used in so many Brass and Stove Foundries.

LET US TALK IT OVER WITH YOU.

Springfield Facing Co. SPRINGFIELD MASS.

"Improvement the Order of the Age."

THREE NEW MODELS

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Nos. 2, 3 AND 4.

HAVE YOU EXAMINED THEM?

Many improvements heretofore overlooked by other manufacturers. Durability the first consideration. Address,

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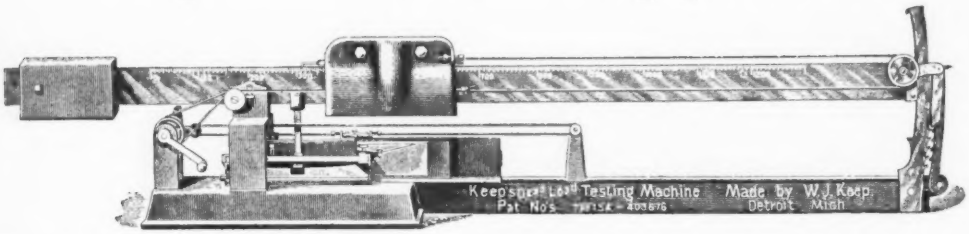
"Keep's Test" Apparatus.



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DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

Very truly yours,
LELAND & FAULCONER MFG. CO.,
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To SAVE MONEY IN YOUR OWN FOUNDRY, ADDRESS **W. J. KEEP, Detroit, Mich.**

THE CHICAGO FLEXIBLE SHAFT CO.

MANUFACTURERS OF

Flexible Shafts

UNDER AN

Improved Process,

insuring great strength and increased durability.

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Superior Shafts for all purposes. Also special and standard

Tools and Appliances

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Largest Facilities
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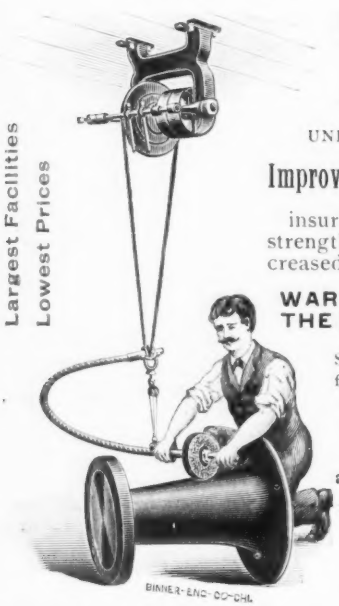

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Nos. 142-144 Ontario St. CHICAGO, ILL.

ESTABLISHED 1854.

Brooklyn Fire Brick Works

CUPOLA BLOCKS, FIRE SAND, FIRE CLAY, FIRE MORTAR, KAOLIN

AND ALL FIRE MATERIAL REQUIRED FOR FOUNDRY PURPOSES.

Send for Illustrated Catalogue and Prices.

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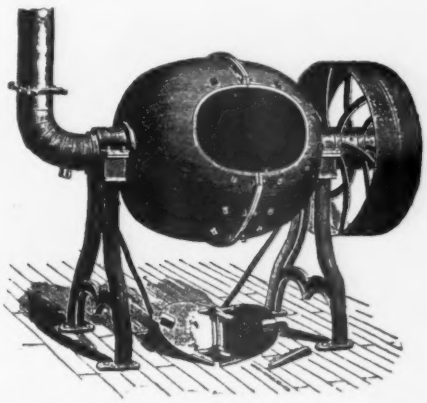
EXHAUST TUMBLING BARREL



The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

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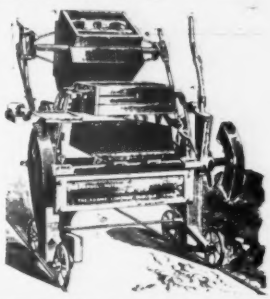

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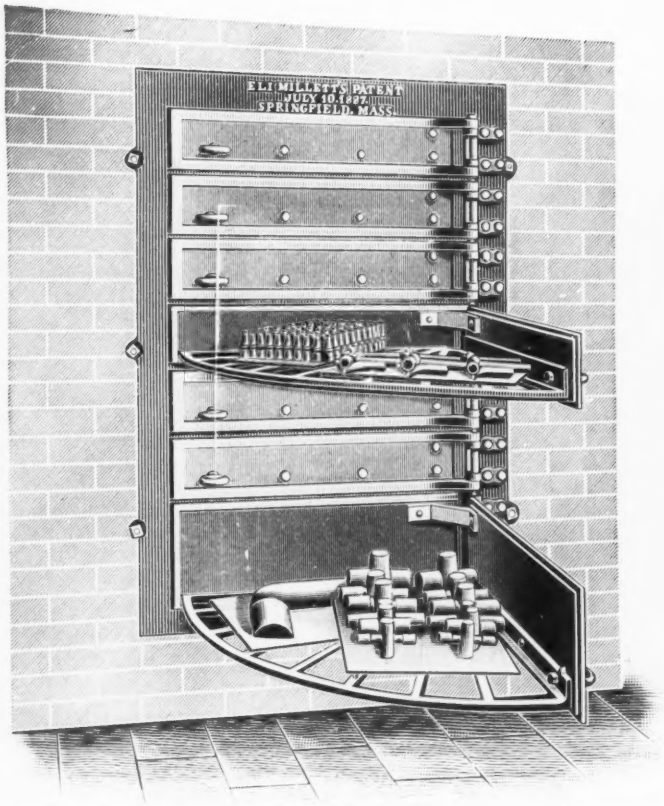

Millett's Patent Core Oven

THE BEST IN THE WORLD

No Foundry using small cores can afford to be without it.

Over one hundred and fifty in use.

Send for our new Catalogue giving names of those using them.

Millett Core Oven Co.

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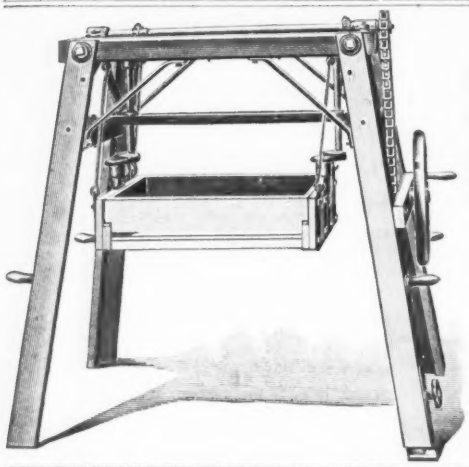

THE PERFECT

Sand Riddling Machine

This is the Best, Simplest, Cheapest, Most Durable and Most Easily Operated Sand Riddling Machine made.

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THE SPRINGFIELD FOUNDRY CO.

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IMPROVED PATENT.. SAND BLAST MACHINERY

TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, Etc.

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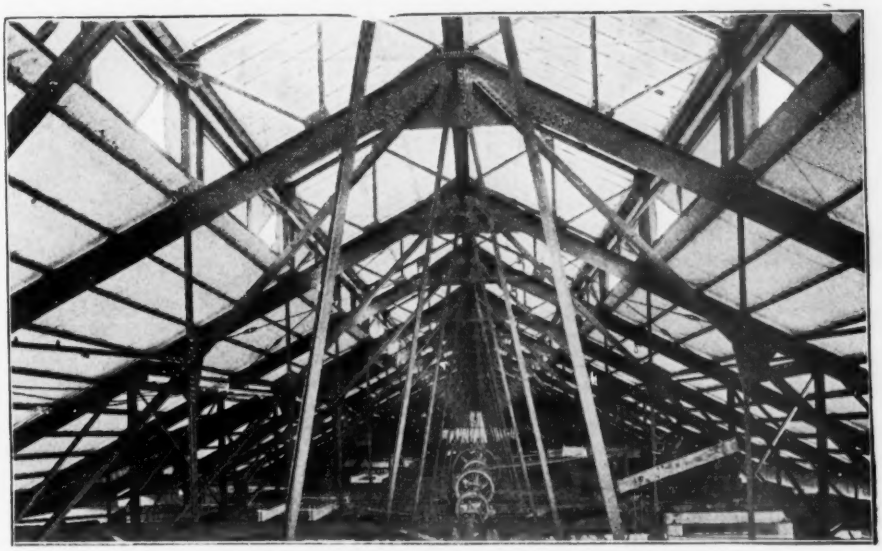
A SUBSTITUTE FOR GLASS . .

Transparent and Unbreakable.



In use in many of the largest foundries and machine shops in the country. Costs less, wears longer, is unaffected by extremes of heat and cold, expansion and contraction, storms, blows, variations in form of roof structure, etc. Send for Catalogue.

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"FAIR DEALING" Their Motto.

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"CLINTON" AND "HECTOR"

INSPECTED FOUNDRY IRONS . . . . .

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Sole Factors for DUNBAR STRONG IRON

In New York and New England.

None but the Best Southern Irons Sold.

FURNACES, PITTSBURGH.

NEW YORK OFFICE, No. 15 Cortlandt St.

Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture.

DEAL WITH THE MANUFACTURER DIRECT.

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(Trade Mark.)

The Universal Liquid Core Compound

Patented in the United States, England, France and Belgium.

GLUTROSE was invented and is manufactured by a practical foundryman of many years' experience. It has been used in the Pennsylvania Railroad Foundry at Altoona and other large foundries for the past three years with the most satisfactory results.

It is cheaper and better than flour, rosin, oil or any other compound in use, takes the place of all other materials and never varies in quality.

Makes the most difficult cores for iron or brass of any size.

The cores come out easily and leave the castings smooth.

Will let the air and gases off from a core which is difficult to do better than any other material in use and makes no offensive smell or smoke.

WILL NEVER BLOW THE CASTINGS.

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FOUNDRY MOLDING MACHINES,
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PORTABLE, AIR-POWER, MACHINES,

USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.

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ELIZABETH, N. J.

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STOW MANUF'G CO.,

BINGHAMTON, N. Y.

INVENTORS OF THE

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FOR ALL PURPOSES.

The oldest and largest manufacturers in the world.

PORTABLE EMERY GRINDER

Take the tool to the work and save heavy handling.

WRITE US FOR CATALOGUE AND PRICES.

A Word

as to

Joseph Dixon Invented the Plumbago Crucible

DATE OF INVENTION
1826.

Dixon's Crucibles have been in the Market SEVENTY YEARS.

Dixon's Plumbago Crucibles

Dixon's Crucibles are Standard all over the GLOBE.
Dixon's Crucibles are used in every country on the Globe where metals are melted.
Dixon's Crucibles have the highest records for HEATS.
Dixon's Crucibles are made to get

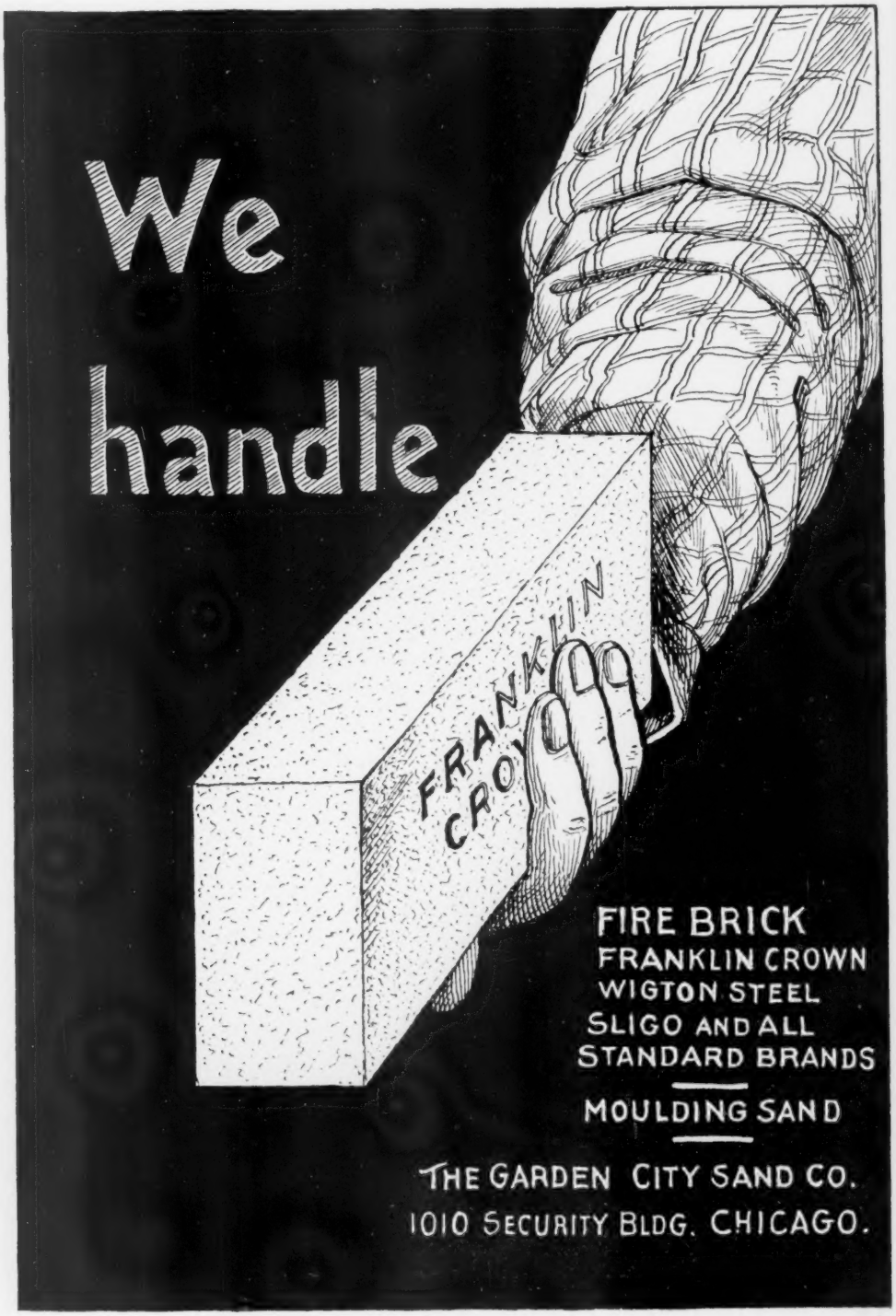
BEST RESULTS WITH THE LEAST COAL.

Dixon's Crucibles are made of many mixtures to suit all kinds of work.
Dixon's Crucibles are made special for Steel Melting.
Dixon's Crucibles are made special for Nickel Melting.
Dixon's Crucibles are made special for Brass Melting.
Dixon's Crucibles are made special for Composition Melting.
Dixon's Crucibles are made special for Phosphor Bronze Melting.
Dixon's Crucibles are made special for German Silver Melting.
Dixon's Crucibles are made special for the Melting of Precious Metals.

In ordering you will be benefitted by mentioning the kind of Metals melted. Write for pamphlet **"How to Use Plumbago Crucibles."** The best are the cheapest, as they must stand the punishment of high heat and much wear and tear. The "Dixon" records in average efficiency, in general good behaviour and in volume of sales, far in the lead.

Jos. Dixon Crucible Company,

JERSEY CITY, N. J.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